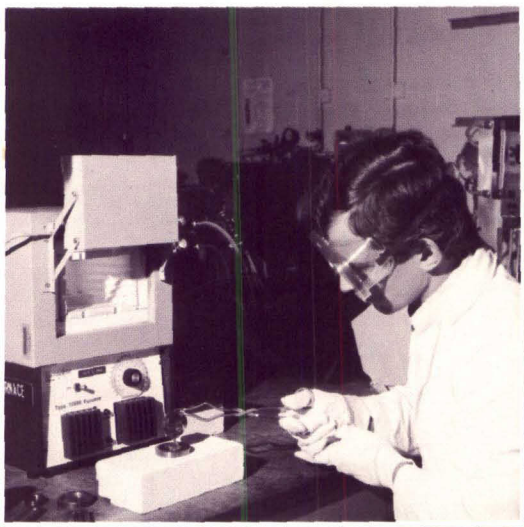
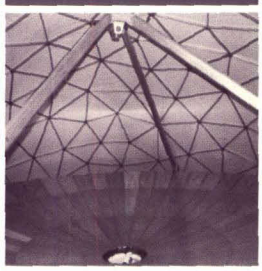
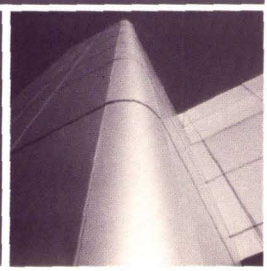
Naval Research Laboratory

Washington, DC 20375-5000
NRL Publication 157-4830, July 1990





1990 Fact Book



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The NRL Fact Book is prepared as a reference source for information about the Naval Research Laboratory (NRL). Fiscal information is current as of 1 November 1989. Personnel and organization changes are current as of 1 February 1990. To provide additional information, a point of contact is listed for each activity.

NRL has a continuing need for physical scientists, mathematicians, engineers, and support personnel. Vacancies are filled without regard to age, race, creed, sex, or national origin. Information concerning current vacancies is furnished on request. Address all such inquiries to:

Civilian Personnel Office (Code 3810)
Naval Research Laboratory
Washington, DC 20375-5000

FIGURE CAPTIONS

Top left-hand corner: Roy J. Rayne, materials engineer, pours molten BiSrCaCuO into a heated copper mold. After it cools, the casting can be machined into virtually any shape. Annealing the machined part in the oven converts it into a high-temperature superconductor. To date, high-temperature superconducting shields and devices that are very sensitive to magnetic fields have been prepared in this way.

Center: Antenna used for space technology research.

Top right-hand corner: NRL's Central Computing Facility (CCF) supports a Cray X-MP/216 supercomputer that has two CPUs and contains sixteen million (64-bit) words of static MOS memory. The Cray is recognized by its C-shaped architectural structure designed to minimize the distance that electronic signals have to travel. Its balanced vector and high-speed scalar processor are capable of obtaining the peak processing speed of 420 million floating-point operations per second (MFLOPS), with a clock cycle time of 8.5 ns.

Lower right-hand corner: NRL's Electro-Optics Laboratory houses the Optical Sciences Division. This research facility includes: computer-controlled environmental systems in each of its 21 optic labs; a two-story draw-tower; a class-100 clean-room suite; special vibrationally isolated laboratory floors; secure electromagnetic-interference-shielded vault offices, labs, and computer room; laser-cooling capability; and liquid and gas piping throughout the facility.

REVIEWED AND APPROVED

CAPT J.J. Donegan, Jr., USN
Commanding Officer
July 1990

1990
Fact Book

NAVAL RESEARCH LABORATORY
WASHINGTON, DC 20375-5000

CONTENTS

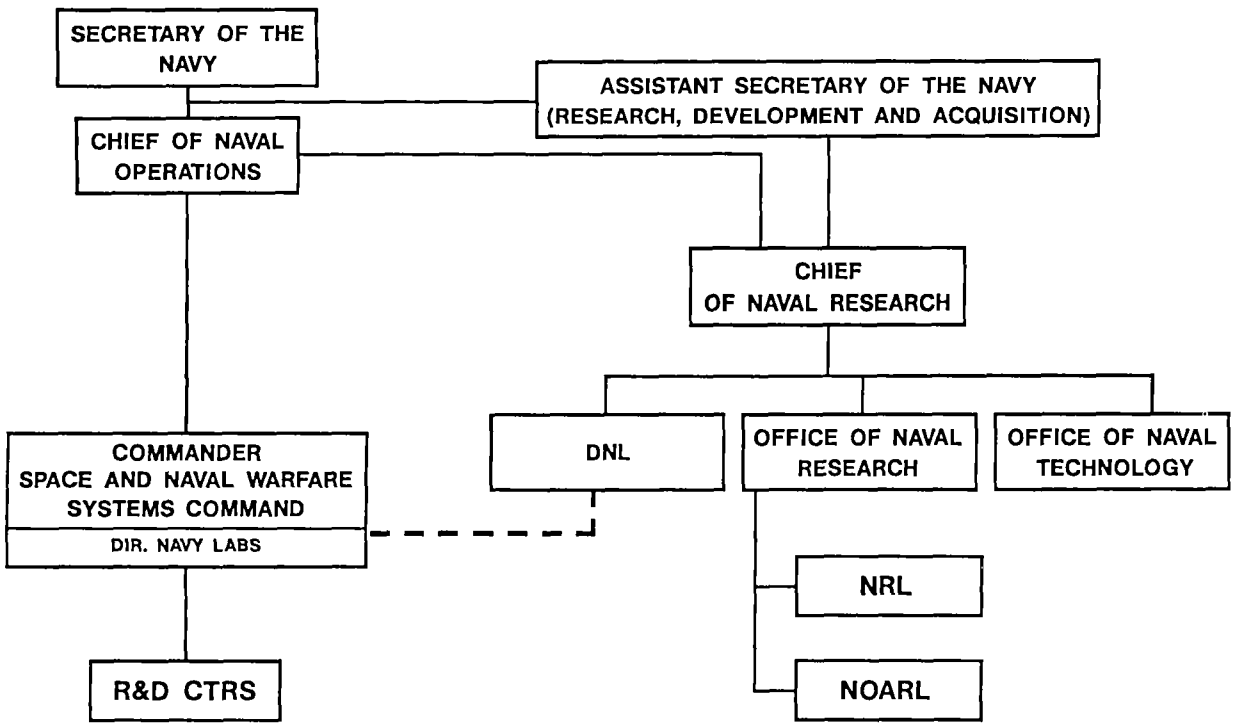
Introduction to the Naval Research Laboratory

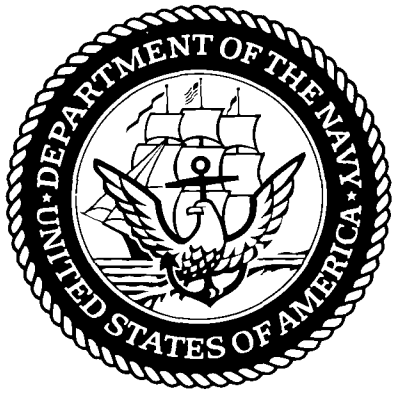
MISSION STATEMENT

To conduct a broadly based multidisciplinary program of scientific research and advanced technological development directed toward new and improved materials, equipment, techniques, systems, and related operational procedures for the Navy.

RESPONSIBLE FOR NAVY-WIDE LEADERSHIP IN:

- The performance of primary in-house research for the physical and engineering sciences;
- The conduct of a broadly-based exploratory and advanced development program in response to identified and anticipated Navy needs;
- The development of space systems for the Navy.


SECRETARY OF THE NAVY
ASSISTANT SECRETARY OF THE NAVY (RESEARCH, DEVELOPMENT AND ACQUISITION)
CHIEF OF NAVAL OPERATIONS
CHIEF OF NAVAL RESEARCH
COMMANDER SPACE AND NAVAL WARFARE SYSTEMS COMMAND
DIR. NAVY LABS
DNL
OFFICE OF NAVAL RESEARCH
OFFICE OF NAVAL TECHNOLOGY
NRL
NOARL
R&D CTRS



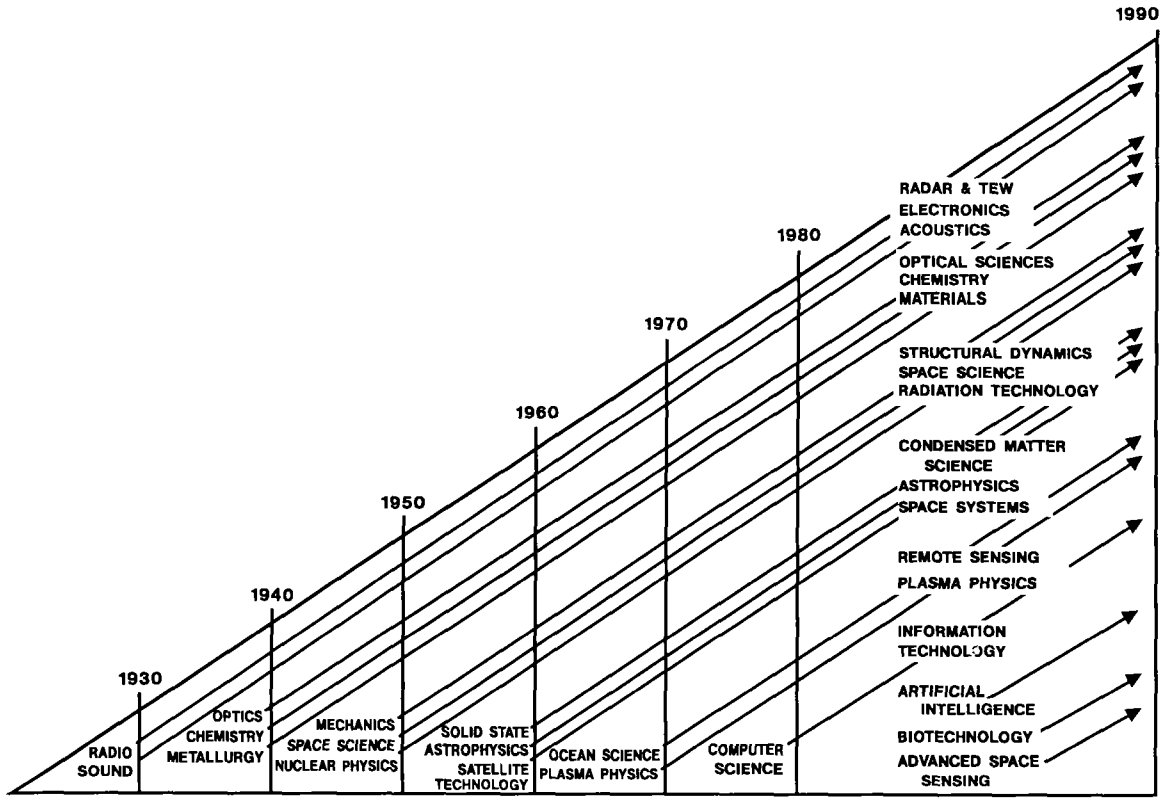
The Naval Research Laboratory in the Department of the Navy

The Naval Research Laboratory (NRL) is the principal in-house research laboratory under the command of the Chief of Naval Research (CNR). As the corporate research laboratory of the Navy, NRL is an important component in the Office of Naval Research's effort to meet its scientific research responsibilities.

For its basic research effort, the Laboratory receives guidance from the CNR that establishes the level of effort and trend direction. The Laboratory then develops a comprehensive research proposal package that is submitted to the CNR for consideration for Navy basic research support. The total Navy basic research program ultimately is evaluated by Congress.

In addition to internal critical review and the evaluation by the CNR and others, the research at NRL is published in refereed journals and/or reported at national and international scientific conferences. There is an aggressive policy of scientific interaction whereby scientists from around the world visit NRL and are visited by NRL scientists. In this way, NRL research is subject not only to management review but also to peer evaluation.

NRL is an important link in the Navy R&D chain. Through NRL, the Navy has direct ties with sources of fundamental ideas in the academic community throughout the world and provides an effective coupling point to the R&D chain for the Office of Naval Research (ONR) Contract Research Department.



NRL PROGRAM EVOLUTION

The Naval Research Laboratory was officially established on July 2, 1923, as the Naval Experimental and Research Laboratory. In the following six decades, research efforts have expanded as shown above from the two original areas of radio and underwater sound to 17 broad areas of scientific endeavor encompassing many diverse fields.

NRL FUNCTIONAL ORGANIZATION

COMMANDING OFFICER
1000


CAPT. J.J. DONEGAN JR.

DIRECTOR OF RESEARCH
1001


DR. T. COFFEY

PROGRAM COORDINATION OFFICE
1500


DR. R.T. SWIM

COMMAND SUPPORT
1200


CAPT. R.W. MICHAUX

- SAFETY
- SECURITY
- FLIGHT DET
- MILOPS
- MILPERS
- MGMT. CONTROL
- CHESAPEAKE BAY DETACH.

ASSOCIATE DIRECTOR OF RESEARCH AT LARGE
1010


MR. J.D. BROWN

BUSINESS OPERATIONS
3000


MR. R.E. DOAK

- PROGRAMS AND MANPOWER
- LEGAL COUNSEL
- MANAGEMENT INFORMATION
- CONTRACTS
- FINANCIAL MANAGEMENT
- SUPPLY
- PUBLIC WORKS
- CIVILIAN PERSONNEL

WARFARE SYSTEMS AND SENSORS RESEARCH
5000


MR. R.R. ROJAS

- ACOUSTICS
- RADAR
- INFORMATION TECH.
- TACTICAL ELECTRONIC WARFARE
- RESEARCH COMPUTATION
- UNDERWATER SOUND REFERENCE DETACH.

NAVAL CENTER FOR SPACE TECHNOLOGY
8000


MR. P.G. WILHELM

- SPACE SYSTEMS DEVELOP.
- SPACECRAFT ENGINEERING
- SPACE SYSTEMS TECH.

GENERAL SCIENCE AND TECHNOLOGY
4000


DR. W.R. ELLIS

- **CENTER FOR ADVANCED SPACE SENSING**
- SPACE SCIENCE
- **LAB. FOR COMPUTATIONAL PHYSICS & FLUID DYNAMICS**
- CONDENSED MATTER & RADIATION SCIENCES
- PLASMA PHYSICS
- TECHNICAL INFORMATION

MATERIALS SCIENCE AND COMPONENT TECHNOLOGY
6000


DR. B.B. RATH

- **LAB. FOR STRUCTURE OF MATTER**
- **CENTER FOR BIOMOLECULAR SCIENCE AND ENGINEERING**
- CHEMISTRY
- MATERIALS SCIENCE & TECH.
- OPTICAL SCIENCES
- ELECTRONICS SCIENCE & TECH.
- ENGINEERING SERVICES

CURRENT RESEARCH

The following areas represent broad fields of NRL research. Under each, more specific topics that are being investigated for the benefit of the Navy and other sponsoring organizations are listed. Some details of this work are given in the *NRL Review*, published annually. More specific details are published in reports on individual projects provided to sponsors and/or presented as papers for professional societies or their journals.

Computer Science and Artificial Intelligence
- Standard computer hardware, development environments, operating systems, and run-time support software
- Methods of specifying, developing, documenting, and maintaining software
- Techniques for naval needs
- Expert systems for resource allocation, signal identification, operational planning, and target classification

Device Technology
- Integrated optics
- Radiation-hardened electronics
- Microelectronics
- MM wave technology
- Hydrogen masers for GPS

Directed Energy Technology
- High-energy lasers
- Chemical lasers
- Laser propagation
- High-power microwave sources
- Charged-particle devices
- Pulse power
- DE effects

Electronic Warfare
- Decoys (RF and IR)
- Repeaters/jammers, EO/IR active countermeasures
- EW/C^3CM system concepts

Enhanced Maintainability, Reliability, and Survivability Technology
- Coatings
- Lubricants and greases
- Water additives and cleaners
- Fire safety
- Laser hardening
- Satellite survivability

Environmental Effects on Naval Systems
- Meteorological effects on electro-optical system performance
- Air quality in confined spaces
- Electromagnetic background in space
- Solar activity
- Ionospheric behavior

Information Management
- Antijam communication links
- Network architectures
- Combat management information systems

Materials
- Superconductivity
- Biomolecular engineering
- Materials processing
- Advanced alloy systems
- Rapid solidification technology
- High-temperature materials
- Laser fabrication and processing
- Ceramics and composite materials
- Thin films and coatings

Space Systems and Technology
- Advanced space systems
- Space sensing applications
- Satellite communications
- Spacecraft design, engineering, and integration
- Satellite ground station design
- Navigation systems

Surveillance and Sensor Technology
- Imaging radars
- Target classification/identification
- Towed acoustic arrays
- Underwater acoustic propagation
- Electromagnetic sensors—gamma ray to RF wavelengths
- SQUID for magnetic field detection
- Low observables technology

Undersea Technology
- Autonomous vehicles
- Bathymetric technology
- Anechoic coatings

Major Capabilities and Facilities

(Listed alphabetically by organizational unit)

Acoustics Division

- Large tank instrumented for investigating acoustic echo characteristics of targets
- Tank 30 ft in diameter by 22 ft in depth, automated with computer control and analysis for detailed studies of acoustic fields, transducers, and other underwater devices
- Multichannel programmable digital data processing system: a system of DEC computers, high-speed array processors, and peripherals for up to 256 channels; designed for acoustic surveillance array processing
- Connection-machine facility: an experimental facility that exploits the natural computational parallelism inherent in data-intensive research problems

Center for Bio/Molecular Science and Engineering

- Langmuir-Blodgett film facility
- Electron microscope facility
- Class 100 clean room/organo/Bio preparation facility
- UV stepper for submicron patterning
- Fiber-optic biosensor facility
- Tubule fabrication facility
- Immunosensor development facility

Chemistry Division

- Nanometer-scale surface analytical facility
- Langmuir-Blodgett film facility
- Chemical diagnostic facility
- Surface diagnostic facility
- Tribology facility
- Paint and coating facility
- Mechanical and chemical characterization of polymers facility
- Surface cleaning facility
- Alternate and petroleum-derived fuels facility
- Combustion research facilities
- High-temperature chemistry facility
- Fire research facilities

Civilian Personnel Division

- Supervisor/manager executive development
- Employment inquiries
- Science, engineering, and computer courses
- Administrative support
- Mechanical and technical trades training
- Long-term and special programs
- Instructional television via tape, microwave, and satellite as well as computer-based training

Command Support Division

- Security
- Workplace monitoring for occupational hazard abatement and sight and hearing conservation
- Safety service
- Fire inspection and protection
- Health physics
- Operational support, using four research-configured P3 Orion aircraft
- Radar experimental test site, which includes a variety of radars; ancillary equipment for test and evaluation of equipment, concepts, and techniques; and overwater ranges
- Tactical electronic warfare test site
- Communications facilities for transmission to and from land, sea, and air
- Hypervelocity gun for ballistics research
- Ship-motion simulator with 12-ton payload capacity
- Navy Technology Center for Safety and Survivability for fire extinguishment research
- Boat services

Condensed Matter and Radiation Sciences Division

- Hypervelocity gun ranges
- 3-MV tandem Van de Graaff accelerator
- 200-kV ion-implantation facility
- 60-MeV electron linear accelerator
- Synchrotron radiation beam lines (at Brookhaven)
- Synchronized laser facility
- Microwave test facility (with the Plasma Physics Division)
- Bomen infrared spectrometer facility
- HYPRES superconducting oscilloscope system

Contracting Division

- Advance acquisition planning
- Acquisition strategies
- Acquisition training
- Contract negotiations
- Contractual execution
- Contract administration
- Acquisition policy interpretations & implementation

Defense acquisition regulation council representation

Electronics Science and Technology Division

Nano- and micro-electronics processing facility
Electron-beam nanowriter
Electron-beam lithography system
Electron microscopes and electro-optical analytical devices
Crystal-growing facilities including bulk growth, molecular beam epitaxy, and organo-metallic chemical vapor deposition
High magnetic field facility
Electronic testing and analysis facilities

Engineering Services Division

Mechanical, electronic, and project engineering and design
Manual and computer-aided design and drafting
Printed circuit CAD/CAM facility (REDAC)
Shops for machining, sheet metal, welding, casting, plating, plastics, printed circuits, electronic assembly, and other fabrication services

Financial Management Division

Accounting
Budget formulation and execution
Funds administration
Vendor and travel payments
Financial systems development
Payroll

Information Technology Division

Extensive computer facilities
Microwave space research facility
HF modem and channel simulation
Brandywine antenna range
Pomonkey test range
Signal analysis laboratory
Artificial intelligence computer network
Distributed simulation and prototyping test bed
Information security test-bed
HCI laboratory

Laboratory for Computational Physics and Fluid Dynamics

Hardware: Two VAX 11/780s, one IRIS 4D graphics workstation and 4 SUN graphics workstations, plus peripherals and terminals. Network and MILNET, LANL X CRAY and Net, APTEC DPS + FPS and NUMERIX array processors, TEKTRONIX 4128 and METHEUS 3610 high-speed graphics processor stations connected to the NRL CRAY X-MP/216, DEC front-end
DICOMED D-38 design station
NRL DICOMED microfilm recorder and
Convex C210 minisupercomputer
Wave channel: a 30-m channel with fan and mechanical wavemaker instrumented for the study of wave generation and wave effects
Tow channel: a 20-m, dual-carriage tow channel with variable stratification for studies of geophysical flows and wakes
Lab measurements and diagnostics: multiple channels of hot-wire/hot-film and laser-Doppler anemometry, visual and infrared digital imagery, fiber optic devices, real-time spectral analysis, and high-resolution pressure transduction

Laboratory for Structure of Matter

Two X-ray diffractometers
Zymark robotics
Evans and Southerland computer graphics display system
Silicon graphics IRIS workstation
Chromatography

Materials Science and Technology Division

Ultrasonic gas atomizer
Hot isostatic press
Consumable arc electrode melter for reactive metals
High-energy, dispersive X-ray analytical system
Electron microprobe SEM and STEM systems
Quantitative metallography
Computer-controlled multiaxial loading and SCC measurement systems
Computer-interactive, nonlinear, multimode fracture measurement system
Computer-aided, experimental stress analysis
Crystallite orientation, distribution function (CODF)
Elevated temperature and structural characterization laboratory
Impression creep and mechanical property evaluation
Automated physical constant measurement system
Nondestructive evaluation laboratory

Closed-loop, low- and high-cycle fatigue systems
Shock and vibration laboratory
Film deposition systems
Magnetometry
Mossbauer spectroscopy
Cryogenic facilities
High-field magnets
High-frequency facilities
Marine corrosion facility

Naval Center for Space Technology

CAD/CAM facility
RF anechoic chambers
Thermal-vacuum chambers
Reverberation chamber
Shock and vibration test facility
Clean-room facilities
Satellite tracking, command, and control facilities
100-ft wave tank for studying dynamics of wind waves and their interactions with long waves; uses microwave Doppler spectrometry and optical and photometric techniques
Spacecraft fabrication and assembly facility
Propellant handling facility

Optical Sciences Division

Electron-beam, electron-beam sustained, X-ray, and UV preionized laser devices with spectroscopic and other diagnostic equipment
Short-pulse excitation apparatus for kinetic mechanisms investigations
Optical warfare laboratory
IR laser facility for optical characterization of semiconducters
Mobile, high-precision optical tracker
Facilities for synthesis and characterization of optical glass compositions and for the fabrication of optical fibers
Hybrid optical/digital image processing facility
Silica and flouride fiber-optic fabrication facilities
Facilities for fabricating and testing integrated optical devices
Optical probes laboratory to study viscoelastic, structural, and transport properties of molecular systems
Computer IR/EO technology/systems simulation center
High-energy pulsed chemical laser laboratory
100-J UV laser research facility
Field-qualified EO/IR measurements devices
Focal plane array evaluation facility

Plasma Physics Division

PAWN, 1-MJ compact inductive storage facility
Gamble II high-voltage pulsed power generators
PHAROS III, three-beam neodymium-glass laser and target facility
1000-J NRL CO_2 laser
7-MJ homopolar generator
High-power free-electron laser and gyrotron facilities
Modified betatron accelerator
Charged particle beam (CPB) propagation range
Super IBEX 5 MV, 100 kA, 40 ns CPB generator
Maxibeam 3 MV, 60 kA, 300 ns CPB generator

Public Works Division

Construction, engineering, repair, and other services to operate, maintain, and improve NRL's physical facilities, including utilities

Radar Division

Radar cross-section measurement system
Radar research and development test beds (at CBD)
Versatile C-, X-, and K_a-band monopulse precision tracking radar systems (at CBD)
IFF ground station
Airborne APS-116 radar with SAR processing
Recording and control system for airborne adaptive array research
Noncooperative target recognition facility
Antenna measurement laboratory
Computer-aided engineering (CAE) facility

Research Computation Division

Central Computing Facility (CCF): Cray X-MP/216 computer (two CPUs with sixteen million words of memory) running COS
VAX 8350(1) and 785s(4), configured as a VMS VAXcluster, front ends the Cray. Provides a variety of services including programming languages, math libraries, electronic mail, bulletin board, database management, document preparation, graphics, and telecommunications processing.
Consultant's Desk, staffed by the RCD to assist CCF users on weekdays 9 a.m. to

5 p.m.
Customer Service Counter (CSC), staffed by CCF operators who register users, service the magnetic tape library, distribute reference material and printer output, etc.
NICENET, the NRL Integrated Communications Environment Network, connects most NRL buildings for computer communications, video services, and gateways to networks and computer systems worldwide (e.g. Internet, DDN/MILNET, SURANET/NSFNET, USAN, SPAN)
Satellite dishes, a "C" and two "Kus," provide video and data reception for NICENET; including news, weather, seminars, and training programs
IRIS 4D/GT, graphics workstation with Matrix camera, color printer, and NTSC video output
RCD training facility, serves the CCF user community as a training room for hands-on courses that are taught by User Services
DECsystem-10, dedicated MIS computer
Technical assistance, programming, consultation, and training

Space Science Division

Waldorf Annex (lower site) that is instrumented for continuous recordings of atmospheric-electricity, micrometeorological, and lightning-flash data and is used for investigations into environmental phenomena
Instrumented micrometeorological tower on San Nicolas Island, CA
Ionospheric sensing and propagation analysis
E.O. Hulburt Center for Space Research
Development and test facilities for space-borne instruments to perform astrophysical, solar, high-atmospheric, and space-environment sensing
Clean-room facilities
Extensive computer-assisted data manipulation and interpretive capability for space-data imaging and modeling
Data center for natural backgrounds
Low temperature laboratory

Supply Division

Acquisition, storage, distribution, and disposal of materials and equipment required by the research directorates

Tactical Electronic Warfare Division

Mobile infrared signature measurement and simulation facility
Mobile ESM laboratory
Hybrid RF/IR missile-seeker simulation facility
Central target simulation facility for developing, testing, and evaluating EW systems and techniques, using real-time, hardware-in-the-loop models
RF simulation laboratory and signal simulators
Radar cross-section measurement facility (at CBD)
Search radar ECM simulator
Advanced tactical EW environment simulator
Electronic warfare coordinating module
Scale-model analysis facility
Wind tunnel for performance measurements of low Reynolds number vehicles
Optical integration laboratory
Tempest signal-processing laboratory
Simulated ship-mast facility

Technical Information Division

DICOMED (computer graphics system)
Electronic publishing
Technical library (2,000 subscriptions, 150,000 monographs and bound journals, and 1,100,000 technical reports (350,000 hard copy and 750,000 microfiche))
LS-2000 on-line library catalog
Microcomputer software support center
Photographic laboratories
Writing, editing, publications consultation
Exhibits
Design services
Video productions
Billboard and *Labstracts*
NRL's television network (NTN)

Underwater Sound Reference Detachment (Orlando, FL)

7-acre lake with a large pier and instrumentation for underwater acoustic studies
Anechoic tank for simulating ocean depths to 2297 ft
Smaller pressure vessels for simulating depths to 22,966 ft
Field station at Bugg Spring with floating platform and instrumentation for acoustic measurements

Major NRL Sites and Facilities

Station and Location	Acreage			Buildings/ Structures
	Navy Title	Easement	Permit or Lease	
District of Columbia				
NRL	129.23		1.45	116/24
Artificial Intelligence Center, Bolling AFB			5.25	1/0
Virginia				
Midway Research Center, Quantico	162.48			8/1
Maryland				
NRL Flight Support Detachment, NAS Patuxent River*†			—	
Chesapeake Bay Detachment, Chesapeake Beach†	167.90		0.02	79/95
Multiple research site, Tilghman Island†	2.00			3/4
Dock facility, Fishing Creek, Chesapeake Bay			0.02	3/2
NRL Waldorf Annex, Waldorf†	23.94	35.16		21/27
Radio Astronomy Observatory, Maryland Point†	24.30		197.88	10/19
Radio antenna range, USAF Receiver Site, Brandywine†			22.98	
Free Space Antenna Range, Pomonkey†	37.10	28.40		11/13
Florida				
Underwater Sound Reference Detachment, Orlando†	10.46			26/21
USRD, Leesburg Bugg Spring			65.0	4/6
Marine Corrosion Facility, Key West*				
Alabama Ex-USS *Shadwell* (LSD-15), Mobile Bay	Decommissioned 457-ft vessel used for fire research			

*Site or equipment used by NRL under an intraservice (Navy) or interservice agreement.
†See maps, General Information section.

PROPERTY

Land:

Owned	621 acres
Leased	583 acres

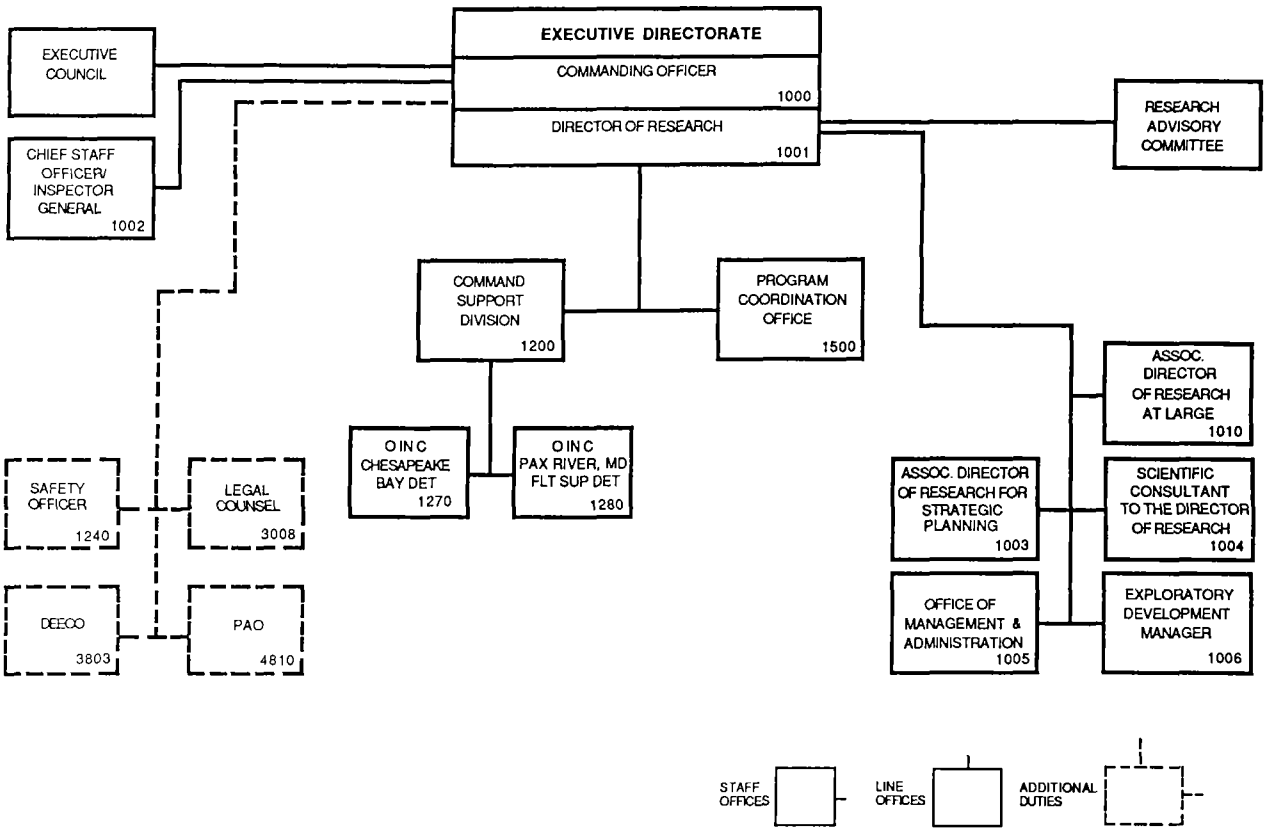
Acquisition costs:

Real property	$159.8 million
Major equipment	$247.2 million
Minor equipment	$41.5 million

Buildings:

RDT&E	2,694,921 ft^2
Administrative	196,558 ft^2
Other	291,753 ft^2

Executive Directorate



Key Personnel

Name	Title	Code
CAPT J.J. Donegan, Jr., USN	Commanding Officer	1000
Dr. T. Coffey	Director of Research	1001
CAPT R.W. Michaux, USN	Chief Staff Officer/Inspector General, Head, Command Support Division	1002/1200
Dr. W.M. Tolles	Associate Director of Research for Strategic Planning	1003
Dr. P. Mange	Scientific Consultant to the Director of Research	1004
Mrs. M. Oliver	Head, Office of Management and Administration	1005
Dr. S. Sacks	Exploratory Development Manager	1006
Mr. J.D. Brown	Associate Director of Research at Large	1010
Mr. J. Stone	Safety Officer	1240
CDR S.I. Kummer, USN†	O in C Chesapeake Bay Detachment	1270
LCDR G.R. Viggiano, USN†	O in C Flight Support Detachment	1280
Dr. R.T. Swim	Head, Program Coordination Office	1500
Mr. R.H. Swennes II†	Legal Counsel	3008
Mr. W. Williams	Deputy Equal Employment Opportunity Officer	3803
Mr. J.W. Gately, Jr.†	Public Affairs Officer	4810

†Additional duty

The Executive Directorate

The Commanding Officer and the Director of Research share executive responsibility for the management of the Naval Research Laboratory. In accordance with Navy requirements, the Commanding Officer is responsible for the overall management of the Laboratory and exercises the usual functions of command including compliance with legal and regulatory requirements, liaison with other military activities, as well as the general supervision of the quality, timeliness, and effectiveness of the technical work and of the support services.

The Commanding Officer delegates line authority and assigns responsibility to the Director of Research for the technical program, its planning, conduct, and staffing; evaluation of the technical competence of personnel; liaison with the scientific community; selection of subordinate technical personnel; exchange of technical information; and the effective execution of the NRL mission.

Within the limits of Navy regulations, the Commanding Officer and the Director of Research share authority and responsibility for the internal management of the Laboratory. The Commanding Officer retains all authority and responsibility specifically assigned to him by higher authority.

The mission of the Laboratory is carried out by four science and technology directorates supported by the Business Operations Directorate and the Executive Directorate. In addition, the Laboratory's operating staffs provide assistance in their special fields to the Commanding Officer and to the Director of Research. The operating staffs are listed on the following pages of this publication.

Commanding Officer (Code 1000)

Captain Donegan was born in Milford, Connecticut in 1940. He enlisted in the Navy in 1958. He completed instruction at the Naval Preparatory School and was appointed to the United States Naval Academy. Upon graduation in 1963, Captain Donegan served in the Engineering Department aboard the destroyer USS PURDY (DD-734). He entered Destroyer School in March 1965 and upon graduation, he was assigned to the precommissioning crew of USS VOGE (DE-1047) as Engineering Officer. In 1968, Captain Donegan reported to the Naval Postgraduate School at Monterey, California, and graduated in 1972 with a Doctorate in Physics. He was then assigned to the Naval Ship Systems Command for his first engineering duty tour. From 1972 to 1979, he served two tours, one as Combat System Engineer for the construction of USS VIRGINIA (CGN-38), and then in the Navy High Energy Laser Project as Deputy Technical Director.

In September 1979, Captain Donegan joined the AEGIS program as the AEGIS Area Commander at the Naval Surface Weapon Center, Dahlgren, Virginia. During this tour, the AEGIS Computer Center was brought on line. In October 1982, he was transferred to the AEGIS Shipbuilding Project at the Naval Sea Systems Command. He was responsible for the design of the Combat System for the Arleigh Burke class destroyers.

In September 1986, Captain Donegan was assigned to the Strategic Defense Initiative Organization in the Office of the Secretary of Defense. He served almost two years as Program Manager for Phase One of the Strategic Defense System; during this time, strategic defense moved from research into a Demonstration and Validation program and the engineering preparation for development started.

Captain Donegan assumed command of the Naval Research Laboratory on 2 June 1989. In December 1989, he was selected for promotion to Rear Admiral.

Captain Donegan has been a member of the Flagship Section Council and National Council of the American Society of Naval Engineers. He is a member of the American Physical Society, the American Association for the Advancement of Science, Naval Institute, and Sigma Xi.

Captain Donegan is married to the former Joanna Helms. They have four children and reside in King George, Virginia.

Director of Research (Code 1001)

Dr. Timothy Coffey was born in Washington, D.C., on June 27, 1941. He graduated from the Massachusetts Institute of Technology in 1962, with a B.S. degree in electrical engineering, and obtained his M.S. (1963) and Ph.D. (1967), both in physics, from the University of Michigan.

During his graduate career, Dr. Coffey worked as a research assistant at the University of California (1963-64), a research physicist at the Air Force Cambridge Research Laboratories (1964-65), and a teaching fellow and research assistant in physics at the University of Michigan (1965-66). As a scientific consultant for EG&G, Inc. (1966-71), he was involved in investigations in theoretical and mathematical physics.

Dr. Coffey came to the Naval Research Laboratory in 1971, as Head of the Plasma Dynamics Branch, Plasma Physics Division. In this position, he directed research in the simulation of plasma instabilities, the development of multidimensional fluid and magnetohydrodynamic codes, and the development of computer codes for treating chemically reactive flows. In 1975, he was named Superintendent, Plasma Physics Division; he was appointed Associate Director of Research for General Science and Technology on January 1, 1980. On November 28, 1982, he was named Director of Research.

Dr. Coffey is recognized as an authority on the theory of nonlinear oscillations and has played a major role in the national program on high-altitude nuclear effects. The author or co-author of over 70 publications and reports, he has made several fundamental contributions to the theory of electron beam/plasma interaction and to the understanding of plasma processes in the Earth's ionosphere.

Dr. Coffey is a fellow of the American Physical Society and a fellow of the Washington Academy of Sciences. Among Dr. Coffey's recent honors and awards are the Senior Executive Service Performance Award and the Rear Admiral William S. Parsons Award for Scientific and Technical Progress (honorable mention). In 1981, he was awarded the Presidential Rank of Meritorious Executive, and in 1987 he received the Distinguished Presidential Rank award.

Executive Council

The Executive Council consists of executive, management, and administrative personnel. The monthly Executive Council meeting is a scheduled forum that provides the Commanding Officer a personal means to relay new policy or changes to current policy that affects all divisions and allows the other members of the Council to advise the Commanding Officer and Director of Research on matters relating to the administration of the Laboratory. The council also provides an opportunity for information exchange among its members. The Executive Council members include:

Commanding Officer, chairperson
Director of Research
Associate Directors of Research
Director, Naval Center for Space Technology
Director, Center for Advanced Space Sensing
Heads of Divisions
Head, Laboratory for Structure of Matter
Head, Center for Bio/Molecular Science & Engineering
Officer in Charge, Chesapeake Bay Detachment
Public Affairs Officer
Deputy Equal Employment Opportunity Officer
Head, Office of Management and Administrative
Head, Safety Branch
Head, Management Information Systems Staff
NRL Counsel

Research Advisory Committee

The Research Advisory Committee advises the Commanding Officer and the Director of Research on scientific programs and the administration of the Laboratory. The committee assists in planning the long-range scientific program, coordinating the scientific work, reviewing the budget, accepting or modifying problems, considering personnel actions, and initiating such studies as may b necessary or desirable. The membership consists of:

Director of Research, Chairperson
Commanding Officer
Associate Directors of Research
Chief Staff Officer (Observer)

OFFICE OF STRATEGIC PLANNING
Code 1003

The Office of Strategic Planning, formed in December 1987, is headed by the Associate Director of Research for Strategic Planning. He is a member of the NRL Research Advisory Committee (RAC). This office carries out the function of strategic planning for NRL, which involves extensive examinations of the internal resources at NRL and the environments external to NRL (with particular emphasis on requirements within DoD and opportunities within the R&D community). Information examined includes projections for R&D, system engineering, resource requirements, laboratory resource and facility capabilities, computer and information technology projections, and the integration of these projections within the framework of Navy requirements. The office has responsibility to handle NRL's technology transfer functions; address other issues related to NRL's long-term future; and integrate directorate and division technology needs into an overall laboratory plan by defining the areas to be addressed and the levels of investment that are required.

Dr. William M. Tolles

Dr. Tolles [redacted]. He obtained his undergraduate degree in chemistry from the University of Connecticut in 1958, and his Ph.D. in chemistry from the University of California, Berkeley in 1962. Subsequently, he spent one year as a Postdoctoral Fellow at Rice University.

In 1962, he assumed an appointment as Assistant Professor of Chemistry at the Naval Postgraduate School. His research there included electron paramagnetic resonance of energetic materials and radiation-damaged species and quantum mechanical calculations of molecular properties.

He served as a consultant for the Naval Weapons Center, China Lake, between the years of 1965 and 1975, where he did considerable research involving the microwave properties of materials.

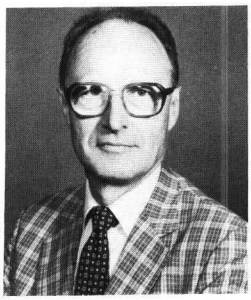
During a five-month period in 1975, he performed research at NRL involving the introduction of Coherent Antistokes Raman Spectroscopy (CARS), nonlinear optical spectroscopic methods (including variations on the Raman induced Kerr effect spectroscopy (RIKES)), and related techniques.

In 1977, as a full professor, Dr. Tolles took the position of Dean of Research at the Naval Postgraduate School, and for four years, he also occupied the position of Dean of Science and Engineering.

He arrived at NRL in February 1984 as the Superintendent of the Chemistry Division. In 1987, he was appointed Associate Director of Research for Strategic Planning.

He is a member of the American Chemical Society, the American Physical Society, the American Optical Society, and Sigma Xi.

Scientific Consultant to the Director of Research
Code 1004



Dr. P. Mange

The Scientific Consultant conducts studies and analyses relating to the technical programs being carried out at the Laboratory on behalf of the Director of Research. He represents the Laboratory on external technical boards, advisory panels, or working groups as requested by the Director of Research and is the Laboratory point of contact with the Strategic Defense Initiative Organization.

Exploratory Development Manager
Code 1006

Dr. S. Sacks

On behalf of the Director of Research, the Exploratory Development Manager carries out program management activities related to the Navy 6.2 (exploratory development) efforts. Mission activities include assurance of technical quality and program relevance, orientation of the program to priority needs and transition opportunities, and overall coordination of NRL 6.2 block efforts. The Exploratory Development Manager is the Laboratory point of contact with the Office of Naval Technology.

Associate Director of Research At Large
Code 1010

Mr. J.D. Brown

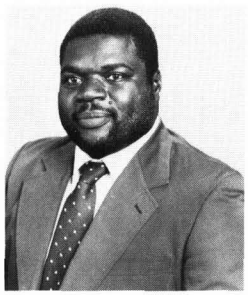
As Associate Director of Research at Large, serves as senior advisor to the Director of Research and the Commanding Officer and carries out studies and analyses relating to the scientific and support programs of the Laboratory. Represents the Laboratory on external technical boards, advisory panels, or working groups as requested by the Director of Research.

Chief Staff Officer/Inspector General
Code 1200/Code 1002

CAPT R.W. Michaux, USN

The Chief Staff Officer serves as the Deputy to the Commanding Officer and acts for the Commanding Officer in his absence. The Chief Staff Officer is the Laboratory's Inspector General, and when directed, he investigates, inspects, and/or inquires into matters that affect the operation and efficiency of NRL. These matters include but are not limited to: effectiveness, efficiency, and economy; safety and occupational health; personnel discipline, morale, and welfare; management practices, command relationships, and organizational structure; and fraud and waste. He serves as principal advisor to the Commanding Officer on all inspection matters and audits and is the principal point of contact and liaison with all agencies outside NRL.

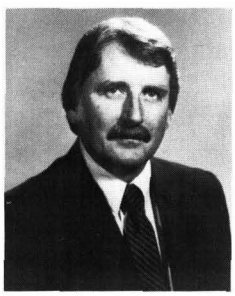
Deputy Equal Employment Opportunity Officer
Code 3803



Mr. W. Williams

The Deputy Equal Employment Opportunity Officer (DEEOO) is the EEO program manager and the advisor to the Commanding Officer on all EEO matters. The DEEOO manages the discrimination complaint process and directs the Laboratory's affirmative action plans and special emphasis programs (Federal Women's, Hispanic Employment, Individuals with Handicaps, and Disabled Veterans). Duties include reviewing, coordinating, and monitoring implementation of EEO policies and developing local guidance, directives, and implementation procedures for the EEO programs. The DEEOO also advises SES and Merit Pay System employees on setting EEO objectives.

Public Affairs Officer
Code 4810 (old Code 2610)



Mr. J.W. Gately, Jr.

The Public Affairs Officer (PAO) advises the Commanding Officer and Director of Research on public affairs matters, including external and internal relations, and serves as the Commanding Officer's principal assistant in the area of public affairs. To do this, the PAO plans and directs a program of public information dissemination on official NRL activities. The PAO coordinates responses to requests from the news media and the public for unclassified information or materials dealing with the Laboratory, coordinates participation in community relations activities, and directs a program of internal information dissemination within the Laboratory. The PAO is also responsible for coordinating all actions within the Laboratory that respond to requirements of the Freedom of Information Act (FOIA).

Office of Management and Administration

Code 1005

Basic Responsibilities

The Office of Management and Administration provides managerial, technical, and administrative support to the Director of Research in his planning and direction of research and development programs in a variety of scientific and engineering disciplines. Specific functions include: performing special studies involving major NRL programs and resource issues; providing administrative support in the areas of personnel, budget, facilities, equipment, and security; reviewing and managing the Director of Research's correspondence; providing management information and analyses for various aspects of the research program effort; coordinating VIP and foreign visits to NRL; managing NRL facilities; providing administrative services, including mail handling and messenger service; managing the NRL Directives System; coordinating unsolicited proposals, congressional correspondence, and other external inquiries; maintaining the NRL R&D achievements file; reviewing and interpreting external Navy and DoD directives addressed to NRL; managing the Defense Retail Interservice Support Program (Host-Tenant Agreements); coordinating the IR&D Program; developing guidance for and monitoring the 6.1 (basic research) Program and 6.2 (exploratory development) Program; providing central word processing services to the Directorate; coordinating the NRL-NRC and ONT Postdoctoral Resident Research Associateship Programs, NRL-U.S. Naval Academy Faculty Co-op Program, Navy ASEE Program, and other special Navy programs; interacting with ONR Headquarters and the R&D Centers; and assisting in the development of NRL's Five-year Plan.

Personnel

Full-time civilian: 57

Mrs. M. Oliver

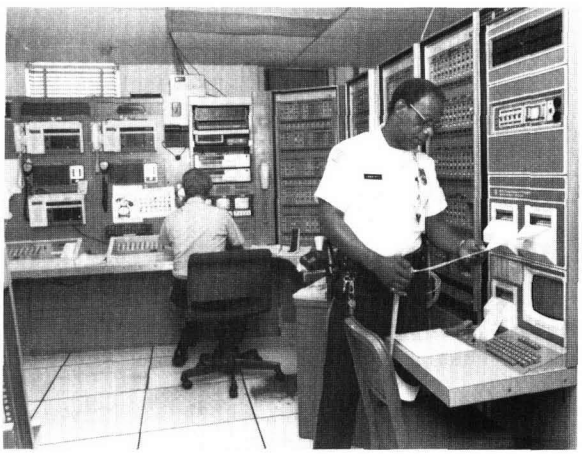
Key Personnel

Name	Title	Code
Mrs. M.C. Oliver	Head, Office of Management and Administration	1005
Mrs. L.S. Herrin	Deputy Head	1005.1
Ms. B.J. McDonald	Administrative Officer	1005.2
Mr. E. Rank	NRL Facilities Manager	1005.4
Mr. R.C. Spragg	Head, Management Information Staff	1005.5
Ms. M.E. Barton	Head, Directives Staff	1005.6
Ms. J. Hileman	Head, GLSIP Program	1005.7
Ms. L.T. Warder	Head, Administrative Services Staff	1005.8

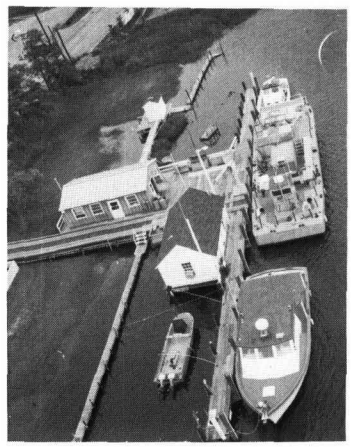
Point of contact: Ms. B.J. McDonald, Code 1005.2, 767-3634

Command Support Division
Code 1200

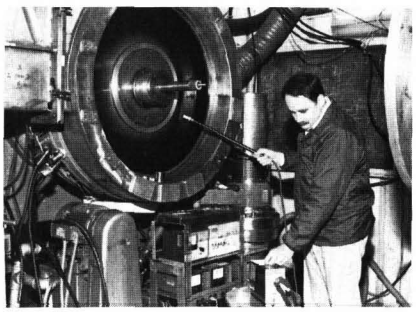
- **MILITARY OPERATIONS**
- **FLIGHT DETACHMENT, CHESAPEAKE BAY DETACHMENT**
- **PERSONNEL AND PHYSICAL SECURITY**
- **SAFETY**



Security monitoring

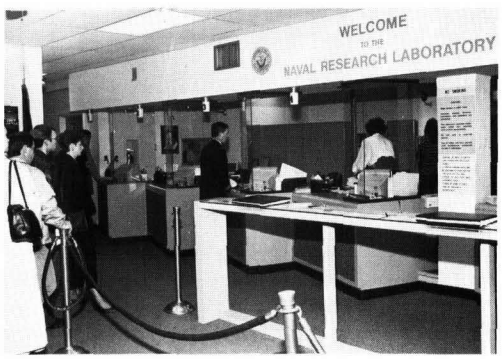


Watercrafts at Chesapeake Bay Detachment used to support Navy research projects

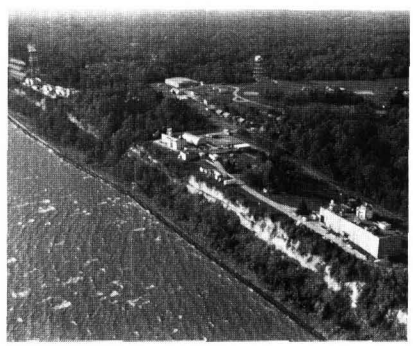


Safety evaluation

P-3 airborne research facility

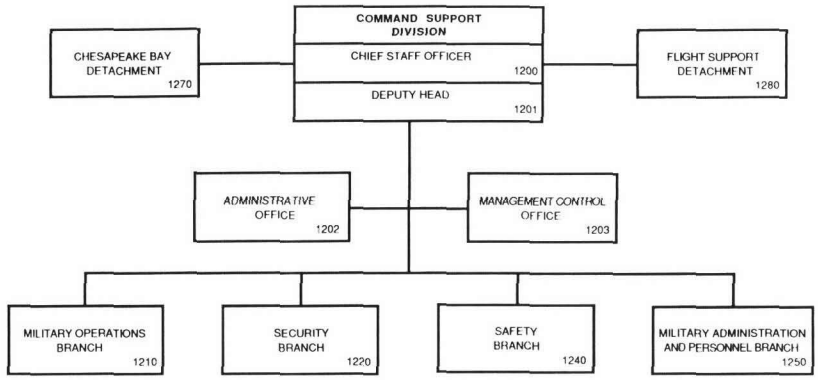


Incoming Visitor's Reception Area



Aerial view of the Chesapeake Bay Detachment

CAPT. R.W. Michaux, USN



Basic Responsibilities

The Command Support Division is headed by the Chief Staff Officer who is also the Laboratory's Inspector General.

The Division provides a military staff to the Commanding Officer and to the Director of Research for direct research support and assistance in the military aspects of the management of the Laboratory. The staff is the liaison with DOD, Navy commands/activities, and the operating forces of the Navy. It supports NRL research and development operations and coordinates military applications of the scientific work of the Laboratory. Direct research support is provided through operations of four multiengine Laboratory aircraft. In addition, the staff arranges for air, surface, and subsurface services as required by research and development operations and coordinates the Research Reserve Program.

The Division is responsible for physical, personnel, communications, information, industrial and ADP security, and fire protection, as well as safety, occupational health, and health physics. It provides intelligence support and support for international cooperative agreements in technology control. The division staff also coordinates the Laboratory's Management Control Programs and provides liaison and coordination for all audit and inspection teams.

The Chesapeake Bay Detachment is located approximately 40 miles from NRL. Facilities at the site support a variety of optical, electronic, chemistry, and other Navy research projects.

Personnel

Full-time civilian: 139
Military: 160

Key Personnel

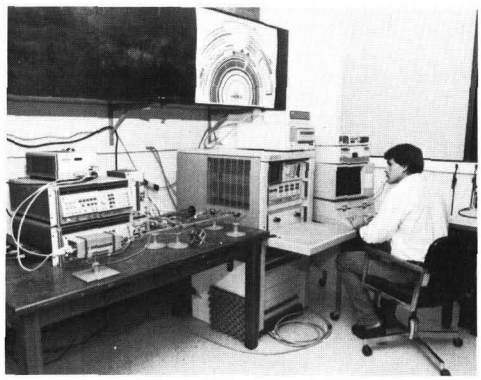
Name	Title	Code
CAPT R.W. Michaux, USN	Chief Staff Officer	1200
Mr. M.B. Ferguson	Deputy Head	1201
Ms. M.S. Rathbun*	Administrative Officer	1202
Ms. M.S. Rathbun	Management Control Officer	1203
CDR J. Taber, USN	Military Operations Officer	1210
Mr. J.R. Gallagher	Communications/Message Center	1215
Mr. M.B. Ferguson	Head, Security Branch	1220
Mr. F. Washington	Head, Classification Management and Control Section	1221
Dr. J. Miller	Head, Special Security Office/Special Activities Office	1225
Mrs. S.A. Cornwell	Head, Personnel and Physical Security Section	1226
Mr. J.N. Stone	Head, Safety Branch	1240
CDR T.R. Nadeau, USN	Head, Military Administration and Personnel Branch	1250
CDR S.I. Kummer, USN	O in C, Chesapeake Bay Detachment	1270
LCDR G.R. Viggiano	O in C, NRL Flight Support Detachment	1280

Point of Contact: Ms. M.S. Rathbun, Code 1202, 767-3204

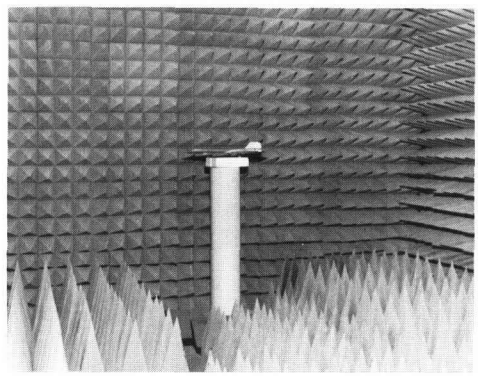
*Acting

Program Coordination Office
Code 1500

- **TECHNOLOGY ASSESSMENT**
- **TECHNICAL PROGRAM MANAGEMENT**
- **LOW OBSERVABLES MATERIALS**
- **MULTIDISCIPLINARY PROGRAMS**
- **MODELING OF SIGNATURES**
- **FIELD SIGNATURE TRIALS**

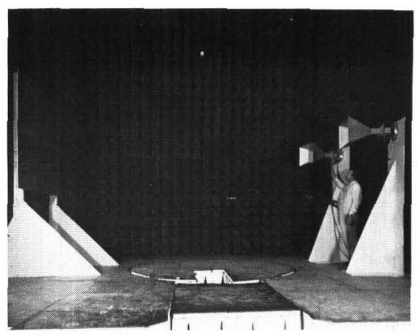


Vector network analysis of new low observables materials



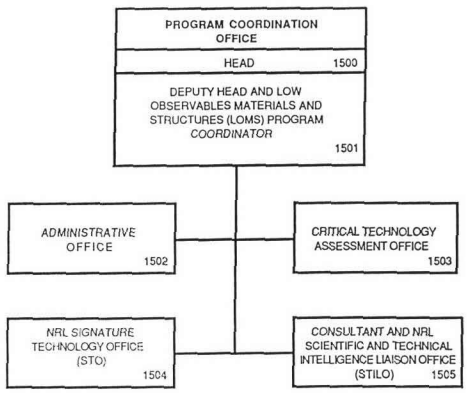
Computer simulation and range validation of signature reduction

Automated NRL arch measurement of radar-absorbing materials



Design and testing of signature reduction concepts

Dr. R.T. Swim



Basic Responsibilities

The Program Coordination Office (PCO) coordinates and/or manages specific NRL programs that may be multidisciplinary in nature, that may span both divisions and directorates, and that may also require special security procedures. It is the Laboratory's focal point within the Navy and DOD for Low Observables programs. The Office conducts or coordinates studies, reviews, and technical assessments in various topical areas. The NRL Scientific and Technical Intelligence Liaison Program and the Critical Technology Assessment Office are contained within the PCO.

Personnel

Full-time civilian: 17

Key Personnel

Name	Title	Code
Dr. R.T. Swim	Head, Program Coordination Office	1500
Dr. D.W. Forester	Deputy Head and Low Observables Materials and Structure Program Coordinator	1501
Mrs. D. Ernst	Administrative Officer	1502
Mr. L.M. Winslow	Head, Critical Technology Assessment Office	1503
Dr. D.W. Forester	Head, NRL Signature Technology Office	1504
Mr. H. Bress	Consultant and NRL STILO	1505

Point of contact: Dr. R. T. Swim, Code 1500, 767-3314

Business Operations Directorate

Business Operations Directorate

Code 3000

The Business Operations Directorate provides executive management, policy development, and program administration for business programs needed to support the activities of the scientific directorates. This support is in the areas of legal counsel, manpower management, financial management, civilian personnel management, supply management, contracting, public works, and management information support.

Associate Director of Research for Business Operations

Code 3000

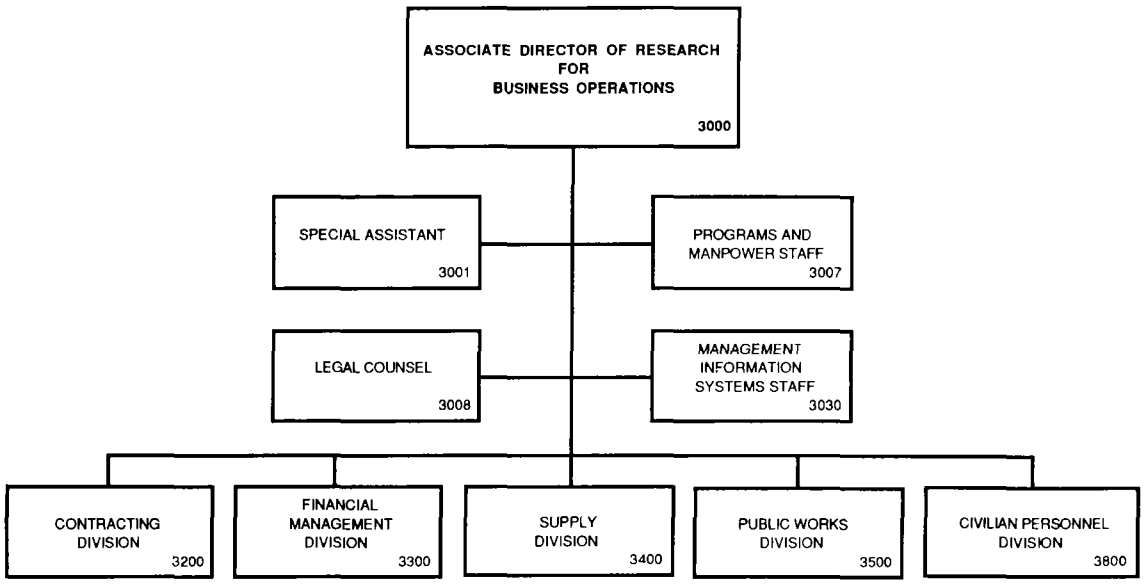
Mr. Robert E. Doak

Mr. Robert E. Doak [redacted]. He graduated from Benjamin Franklin University with a bachelor's (BCS) degree in accounting in 1964 and a master's (MCS) degree in business administration in 1966. Mr. Doak is a Certified Public Accountant (CPA) licensed by the State of Maryland.

Mr. Doak has twenty-two years of diversified experience with the federal government performing in various line management positions. He has extensive experience in program management, financial management, contract policy and administration, personnel policy and administration, ADP systems development and operations, and the full spectrum of management disciplines associated with the development, production, and operational support of major weapon systems.

From 1967 to 1980, Mr. Doak served in several positions with the Navy's Strategic Systems Projects Office. In these positions he was responsible for the business management operations for the Navy's Fleet Ballistic Missile programs. In 1980, he entered the Senior Executive Service and served as Director of Financial Management with the Bureau of Indian Affairs. From 1981 to 1985, he served as Deputy Director, Plans and Programs, with the Strategic Systems Programs Office. From 1985 to 1989, he served as Deputy Commander with the Space and Naval Warfare Systems Command. In March 1989, Mr. Doak was appointed Associate Director of Research for Business Operations at the Naval Research Laboratory.

Mr. Doak has a consistent record of outstanding performance since entering the Senior Executive Service in 1980. In 1984, he was awarded the Navy Superior Service Award. In 1985 and 1988, he received Navy Rank Awards. In 1986, Mr. Doak received the Presidential Meritorious Executive Rank Award, and in 1988, he received the Presidential Distinguished Executive Rank Award.



Key Personnel

Name	Title	Code
Mr. R.E. Doak	Associate Director of Research for Business Operations	3000
Vacant	Special Assistant	3001
Ms. J. Cummings	Programs and Manpower Staff	3007
Mr. R.H. Swennes II	Legal Counsel	3008
Mr. R.L. Guest	Head, Management Information Systems Staff	3030
Mr. J.H. Ablard	Head, Contracting Division	3200
Mr. D.T. Green	Comptroller	3300
CDR W.E. Ralls, Jr., SC, USN	Supply Officer	3400
CDR C.R. Allshouse, CEC, USN	Public Works Officer	3500
Mrs. B.A. Duffield	Head, Civilian Personnel Division	3800

Point of contact: Ms. Georgine L. Spisak, Code 3000A, 404-7462

Management Information Systems Staff

Code 3030

Basic Responsibilities

The Management Information Systems Staff has dual responsibilities: conducting administrative data processing for the Laboratory, and designing, implementing, and controlling the Laboratory Management Information System (MIS) and its databases. The Staff Head participates directly with the Commanding Officer, the Director of Research, and the Associate Director for Business Operations in all policy matters pertaining to MIS and business data processing.

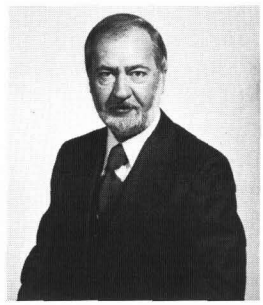
Personnel

Full-time civilian: 20

Key Personnel

Name	Title	Code
Mr. R.L. Guest	Head, Mgt. Info. Sys. Staff	3030
Mr. K. Bell*	Head, Systems Development Section	3035
Mr. W.L. Gollaher	Head, Applications Systems Support	3036
Ms. D. Buckler	Head, Operations Section	3037

Point of contact: Phyllis Thompson, Code 3030, 767-2030

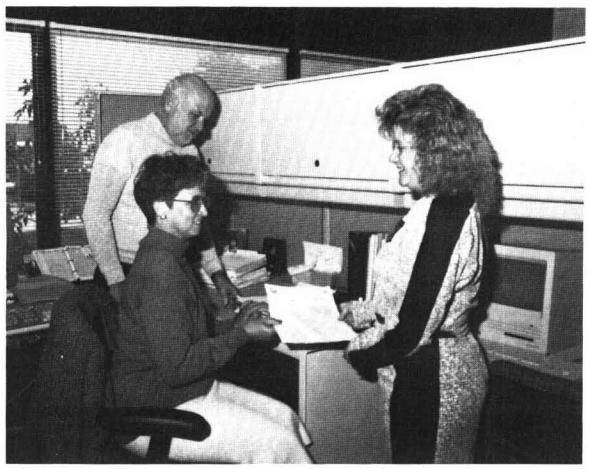


Mr. R.L. Guest

*Acting

Contracting Division
Code 3200

- **ADVANCE ACQUISITION PLANNING**
- **ACQUISITION STRATEGIES**
- **ACQUISITION TRAINING**
- **CONTRACT NEGOTIATIONS**
- **CONTRACTUAL EXECUTION**
- **CONTRACT ADMINISTRATION**
- **ACQUISITION POLICY INTERPRETATION & IMPLEMENTATION**
- **DEFENSE ACQUISITION REGULATION COUNCIL REPRESENTATION**

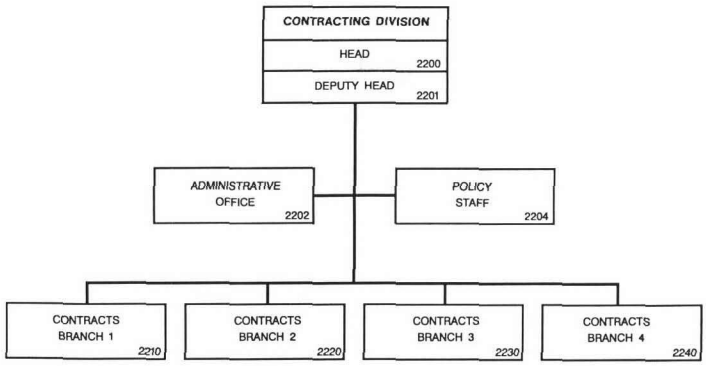


Deputy branch head discusses Management of Contract Actions (MOCA) with a procurement specialist and a contract specialist

Policy section head and branch head confer about regulation changes

Procurement assistant discusses incoming procurement requests

Mr. J.H. Ablard



Basic Responsibilities

The Contracting Division is responsible for the acquisition of major research and development, materials, services, and facilities where the value is in excess of $25,000. It also maintains liaison with the ONR Procurement Directorate on procurement matters involving NRL. Specific functions include: providing consultant and advisory services to NRL division personnel on acquisition strategy, contractual adequacy of specifications, and proposal sources; reviewing procurement requests for accuracy and completeness; initiating and processing solicitations for procurement; awarding contracts; performing contract administration and post-award monitoring of contract terms and conditions, delivery, contract changes, patents, etc., and taking corrective actions as required; providing acquisition-related training to appropriate division personnel; interpreting and implementing acquisition-related Federal Department of Defense and Navy regulations; and chairing the Defense Acquisition Regulation Council (DAR) Subcommittee on Research & Development.

Personnel

Full-time civilian: 64

Key Personnel

Name	Title	Code
Mr. J.H. Ablard	Head, Contracting Division	3200
Mrs. A. Stuart	Deputy Head	3201
Mrs. J. Price	Administrative Officer	3202
Mrs. D. Lockamy	Head, Policy Staff	3204
Mr. J. Waldenfels	Contract Branch #1	3210
Mr. A. Guida	Contract Branch #2	3220
Ms. M. Carpenter	Contract Branch #3	3230
Mrs. C. Hayes	Contract Branch #4	3240

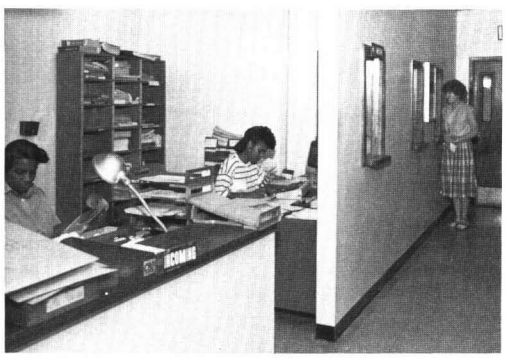
Point of Contact: Mrs. J. Price, Code 3202, 767-3749

Financial Management Division
Code 3300

- GENERAL ACCOUNTING
- COST ACCOUNTING
- SYSTEMS ACCOUNTING
- DISBURSING
- BUDGET

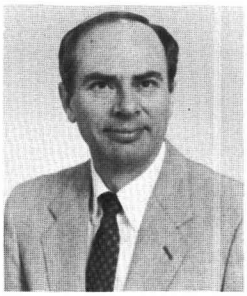
The Accounting Branch is divided into several sections that perform services essential to the Laboratory including vendor payments, payroll, payment information, and ledger accounting.

As a support division, our most important assets are the dedicated, knowledgeable employees within our area. Pictured above, Financial Management Division employees are providing valuable services in paying vendors and researching prompt payment actions.

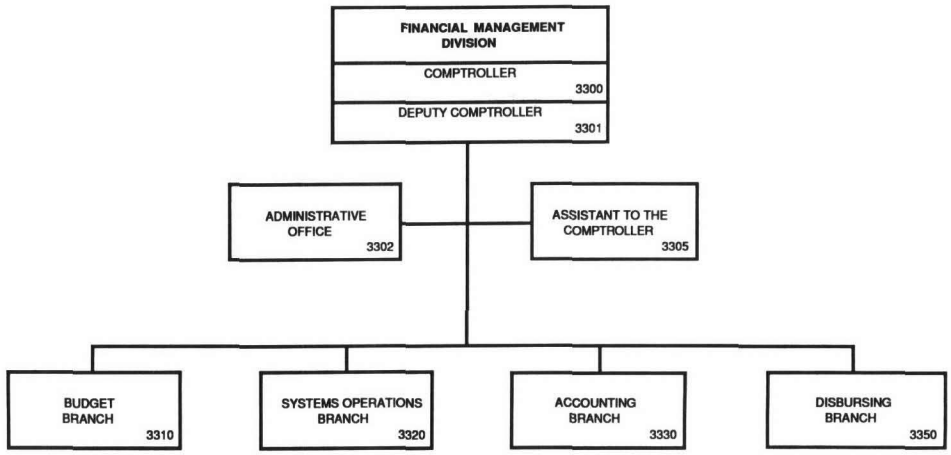


The Disbursing Branch is the most visible portion of the Financial Management Division. Its role in the Laboratory's operation includes disbursing checks, processing travel orders, and auditing.

The Payroll Section of the Accounting Branch provides customer services, processes payroll, and interacts with all divisions, branches, and personnel within the Naval Research Laboratory.



Mr. D.T. Green



Basic Responsibilities

The Comptroller is the financial adviser to the Commanding Officer, the Director of Research, and other officials of the Laboratory, and he administers the financial program of the Laboratory.

The Financial Management Division provides services to the Laboratory in budget formulation and funds administration, program and budget analysis, accounting and reporting, and disbursing.

Personnel

Full-time civilian: 102

Key Personnel

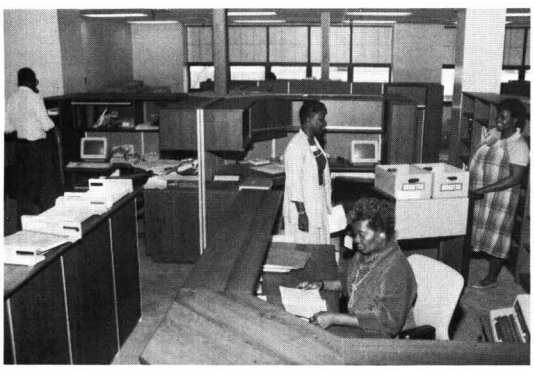
Name	Title	Code
Mr. D.T. Green	Comptroller	3300
Vacant	Deputy Comptroller	3301
Mrs. A.J. Downs	Administrative Officer	3302
Mr. E.S. York	Assistant to the Comptroller	3305
Ms. G. Bell	Head, Budget Branch	3310
Mr. M. Mills	Head, Systems Operations Branch	3320
Mr. J. Thomas	Head, Accounting Branch	3330
Mrs. T. Sherman	Head, Disbursing Branch	3350

Point of contact: Mrs. A.J. Downs, Code 3302, 767-2950

Supply Division
Code 3400

- **ADMINISTRATIVE SERVICES**
- **CUSTOMER LIAISON**
- **AUTOMATED INVENTORY MANAGEMENT SYSTEM**
- **PURCHASING**
- **RECEIPT CONTROL**
- **MATERIAL**
- **TECHNICAL**

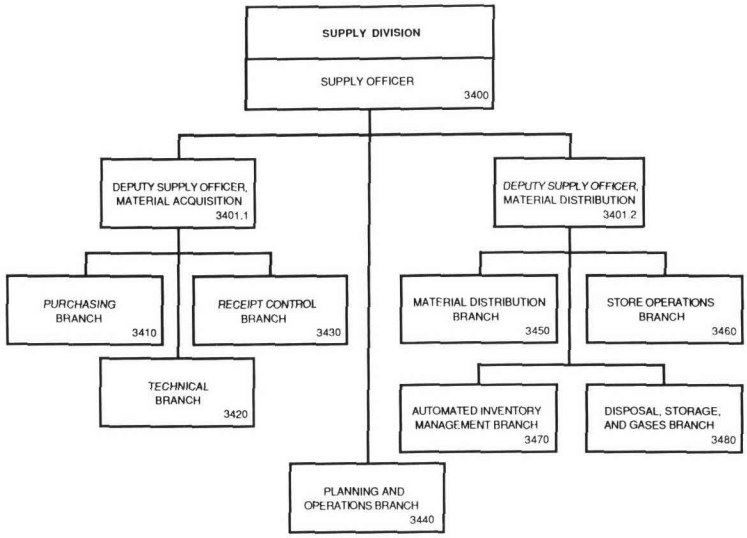
Interior of Supply Stores 33 and 99, Bldg. A-52, featuring glass display cases and modern storage systems to better service NRL customers



Supply technicians and inventory management specialists are gathering information for customers

An inspector verifies the contents of a package

CDR W.E. Ralls, Jr.



Basic Responsibilities

The Supply Division provides the Laboratory and its field activities with contracting, supply management, and logistics services. Specific functions include: procuring required equipment, material, and services; receiving, inspecting, storing, and delivering material and equipment; packing, shipping, and traffic management; surveying and disposing of excess and unusable property; operating various supply issue stores and performing stock inventories; providing technical and counseling services for the research directorates in the development of specifications for a complete procurement package; and obtaining and providing guidance in the performance stages of contractual services.

During FY 1989, the Supply Division processed 41,000 purchasing actions, which totaled approximately $58,395,162. Inventory in the eight stores and bulk warehouse averaged $1,289,298 and 9,812 line items.

Personnel

Full-time civilian: 160
Military: 1

Key Personnel

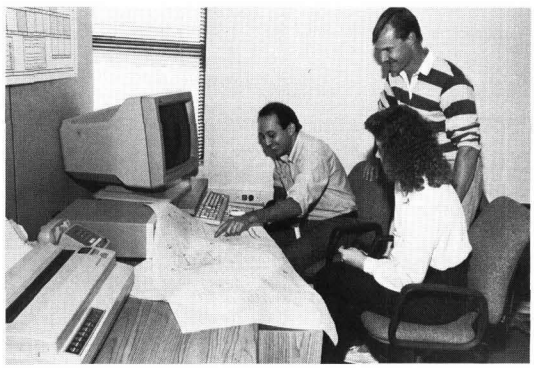
Name	Title	Code
CDR W.E. Ralls, Jr., SC, USN	Supply Officer	3400
Mr. W. Rock	Deputy Supply Officer Material Acquisition	3401.1
Mr. S. Kinney	Deputy Supply Officer Material Distribution	3401.2
Vacant	Head, Purchasing Branch	3410
Mr. B.A. Copson	Head, Technical Branch	3420
Mr. J.J. Dupcavitch	Head, Receipt Control Branch	3430
Mrs. C. Hartman	Head, Planning and Operations Branch	3440
Mr. E. Denning	Head, Material Distribution Branch	3450
Mrs. E.I. Woodland	Head, Store Operating Branch	3460
Mrs. L. Shaw*	Head, Automated Inventory Management Branch	3470
Mr. J. Cestone	Head, Disposal, Storage, and Gases Branch	3480

Point of contact: Mrs. C. Hartman, Code 3402, 767-3478

*Acting

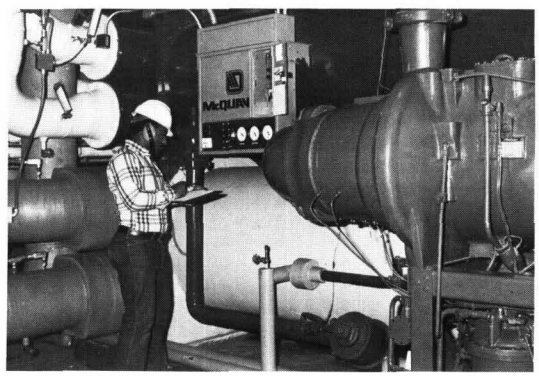
Public Works Division
Code 3500 (old Code 2500)

- ENGINEERING
- MAINTENANCE AND UTILITIES
- MAINTENANCE CONTROL
- CONTRACT ADMINISTRATION
- ADMINISTRATION
- PROGRAMMING
- FACILITIES SUPPORT CONTRACTS



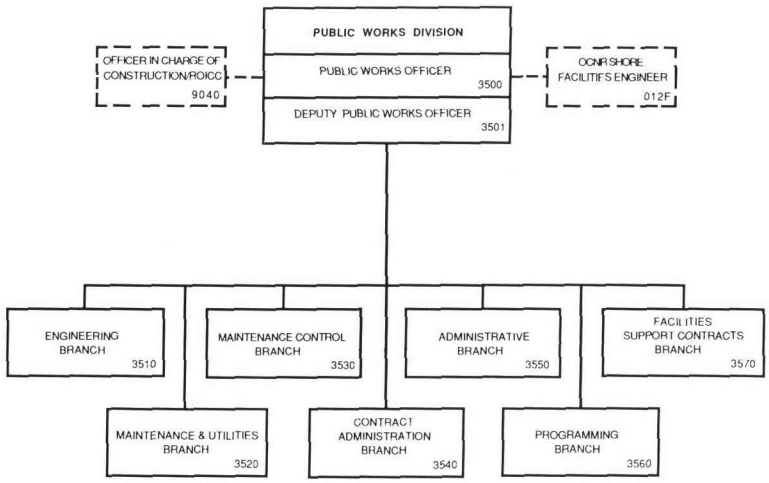
The Public Works Division has a large in-house engineering staff to provide electrical, mechanical, and civil/structural modifications and repairs to NRL's many facilities.

This technician is repairing an electronic security board. The Maintenance and Utilities Branch has 10 shops employing a skilled shop force of more than 200 personnel.



Checking operations at the Central Chilled Water Plant. The division also operates and maintains a central steam plant, electrical distribution, and telephone/alarm system communication networks.

CDR C.R. Allshouse



Basic Responsibilities

The Public Works Division is responsible for the physical plant of NRL. This includes: responsibility for the design, construction, maintenance, and repair of public works and utilities; responsibility for the operation of these public works and utilities in accordance with the technical standards of the Naval Facilities Engineering Command; and supporting the scientific program of the Laboratory by the construction, repair, and alteration of experimental and test equipment. In addition, the Division obtains required approvals for work for which the Division is responsible from the Chesapeake Division of the Naval Facilities Engineering Command, the Office of Naval Research, the Secretary of the Navy, and other authorities as appropriate.

The Public Works Division also supports the Office of the Chief of Naval Research for Facilities Coordination and supports the Resident Officer in Charge of Construction on all Naval Facilities Engineering Command and certain other research and development contracts at NRL.

Personnel

Full-time civilian: 312
Military: 2

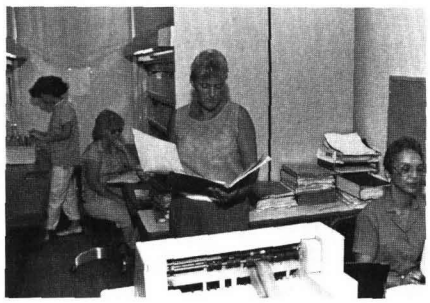
Key Personnel

Name	Title	Code
CDR C.R. Allshouse, CEC, USN	Public Works Officer/Officer in Charge of Construction/OCNR Shore Facilities Engineer	3500/9040/ OCNR-012F
Mr. D. Woodington	Deputy Public Works Officer	3501
LT R.E. Long, CEC, USN	Facilities Energy Conservation Program Manager	ONR-1234
Mr. J. Botkin	Head, Engineering Branch	3510
Mr. C.B. Conner	Head, Maintenance and Utilities Branch	3520
Mr. S. Harrison	Head, Maintenance Control Branch	3530
Mr. J. Carr	Head, Contract Administration Branch	3540
Mrs. A. Coats	Head, Administrative Branch	3550
Vacant	Head, Programming Branch	3560
LCDR K. Roman, CEC, USN	Head, Facilities Support Contracts Branch	3570

Point of contact: Mrs. A. Coats, Code 3550, 767-2168

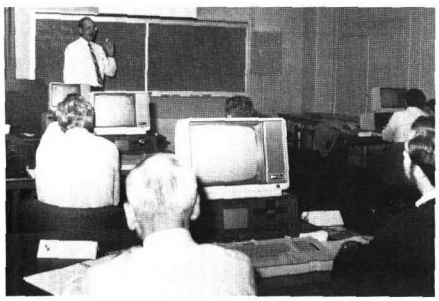
Civilian Personnel Division
Code 3800

- **PERSONNEL OPERATIONS**
- **EMPLOYEE DEVELOPMENT**
- **EMPLOYEE RELATIONS**
- **EQUAL EMPLOYMENT OPPORTUNITY**



Personnel actions, records, and reports

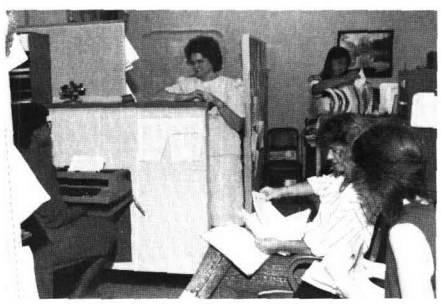
EEO staff



Training—management use of personal computers

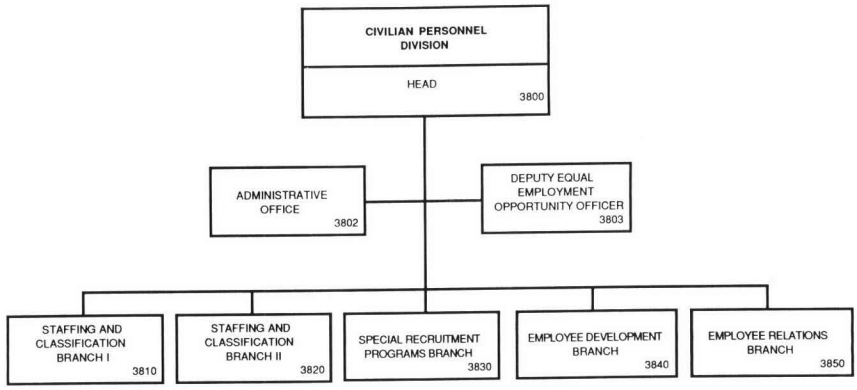
Personnel reception area

Employee Relations staff



Staff of the Special Recuitment Branch

Mrs. B.A. Duffield



Director of Civilian Personnel

The Director of Civilian Personnel (OCNR Code 0124) of the Consolidated Civilian Personnel Office (Headquarters, ONR, NRL, and Naval Ocean Research & Development Activity) is Mr. D.J. Blome. His office is located at the Office of the Chief of Naval Research in Arlington, Virginia. The on-site NRL division head is Mrs. B.A. Duffield.

Basic Responsibilities

The Civilian Personnel Division administers the Laboratory's personnel program, which includes selection, development, promotion, utilization, appropriate recognition, and employee counseling and services for all civilian personnel.

Personnel

Full-time civilian: 63

Key Personnel

Name	Title	Code
Mr. D.J. Blome	Director of Civilian Personnel	OCNR Code 0124
Mrs. B.A. Duffield	Head, Civilian Personnel Division	3800
Mr. D. Schenk	Assistant Head, Civilian Personnel Division	3801
Mrs. P.L. Hetzler	Administrative Officer	3802
Mr. W. Williams	Deputy Equal Employment Opportunity Officer	3803
Mrs. D. Fulton	Federal Women's Program Manager and Handicap Program Manager	3803.1
Mrs. S. Dyer	Head, Staffing and Classification Branch I	3810
Mrs. C. Lowell	Head, Staffing and Classification Branch II	3820
Mrs. C. Downing	Head, Special Recruitment Programs Branch	3830
Mr. A.H. Sass	Head, Employee Development Branch	3840
Ms. J. Hupp	Head, Employee Relations Branch	3850

Point of contact: Mrs. P. L. Hetzler, Code 3802, 767-3421

General Science and Technology Directorate

General Science and Technology Directorate

Code 4000

The Navy's operational effectiveness depends on its ability to keep pace with rapidly developing technologies. The directorate contributes to this requirement by conducting research in advanced space sensing, reactive flow physics, and computational physics; astrophysics; atmospheric, ionospheric, space, and plasma sciences; fundamental properties of materials; radiation; and pulsed power technologies. Areas of particular emphasis include solar physics, wide-spectrum astronomy, fluid mechanics and hydrodynamics, modeling of atmospheric and ionospheric processes, nuclear weapons effect simulations, high-energy density storage devices, interactions of various types of radiation with matter, survivability of materials and components, and directed energy devices. The directorate provides administrative and technical services to support the Laboratory's mission through the operation of the Technical Information Division.

Associate Director of Research for General Science and Technology

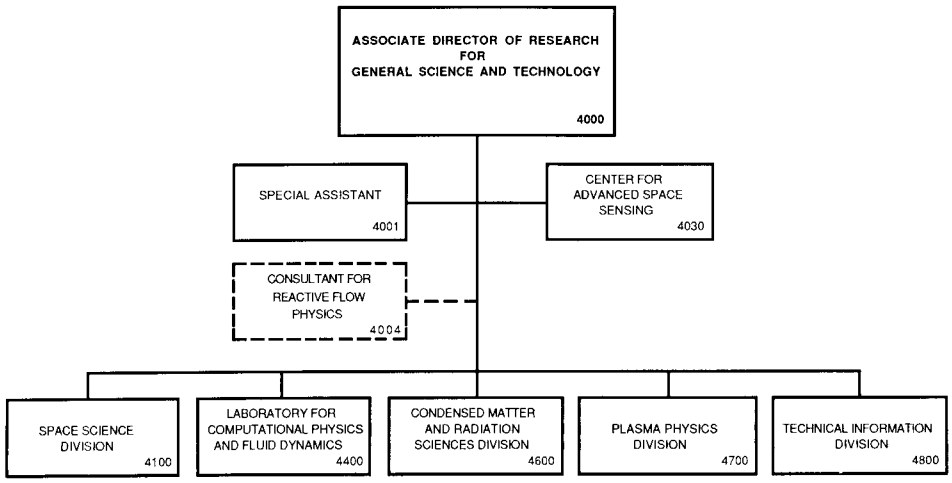
Code 4000

Dr. William R. Ellis

Dr. Ellis [redacted]. He obtained his undergraduate degree in physics from Clemson University in 1962 and did his graduate work at Princeton University, where he obtained an M.S. degree in 1965 and a Ph.D. in 1967, gaining one of the first doctorates awarded in the emerging field of plasma propulsion.

In 1967-69, Dr. Ellis worked at the Culham Laboratory for Plasma Physics and Fusion Research in England, where he headed an experimental group investigating toroidal discharge physics problems in plasma confinement. In 1970, he accepted a position with the Los Alamos Scientific Laboratory in New Mexico where he became Associate Group Leader for the Scyllac experimental group in the Controlled Thermonuclear Research Division. In 1976, Dr. Ellis joined the Energy Research and Development Administration (ERDA), the predecessor agency of the Department of Energy. In 1979, he was appointed Director of the Department of Energy's Mirror Confinement Systems Division in the Office of Fusion Energy, Office of Energy Research, where he was responsible for programs to develop fusion power reactors based on the magnetic mirror confinement concept. Dr. Ellis was appointed Associate Director of Research for General Science and Technology at the Naval Research Laboratory in October 1983.

Dr. Ellis is a member of the American Physics Society, Sigma Xi, American Association for the Advancement of Science, and the American Geophysical Union. He served on the Executive and Prize Committees of the APS Division of Plasma Physics, the Program Committee of the International School of Plasma Physics in Varenna, and the Department of Energy's USA/USSR Joint Fusion Power Coordinating Committee. He has received the Department of Energy's Exceptional Service Award and is a patentee in his field. He is the Navy's Technical member on the Under Secretary of Defense's High Power Microwave Executive Steering Group, Program Implementation Panel, and Chairman of the Directed Energy Coordinating Committee of the Naval Research Laboratory. In 1989, he received the Presidential Rank Award of Meritorious Executive. Dr. Ellis has published over 100 papers, reports, and articles in the areas of experimental and theoretical plasma physics and fusion research. He also has authored a regular newspaper column (about 50 articles) on science and the environment.



Key Personnel

Name	Title	Code
Dr. W.R. Ellis	Associate Director of Research for General Science and Technology	4000
Mrs. B.J. Turner	Special Assistant	4001
Dr. E.S. Oran†	Consultant for Reactive Flow Physics	4004
Dr. K. Johnson	Director, Center for Advanced Space Sensing	4030
Dr. H. Gursky	Superintendent, Space Science Division	4100
Dr. J.P. Boris	Chief Scientist and Director, Laboratory for Computational Physics and Fluid Dynamics	4400
Dr. D.J. Nagel	Superintendent, Condensed Matter and Radiation Sciences Division	4600
Dr. S. Ossakow	Superintendent, Plasma Physics Division	4700
Mr. P. Imhof	Head, Technical Information Division	4800

Point of contact: Nancy H. Sell, Code 4000A, 767-3324

†Additional duty

Center for Advanced Space Sensing

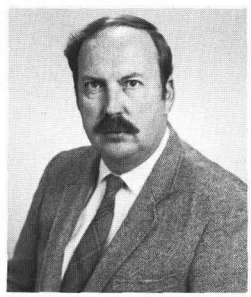
Code 4030

Basic Responsibilities

The Center for Advanced Space Sensing conducts a program of basic research, science, and applications aimed at the development of new concepts for sensors and imaging systems for objects and targets in the earth and near-earth environment as well as deep space in the wavelength range from ultraviolet to radio. The research, both theoretical and experimental, deals with discovering and understanding the basic physical principles and mechanisms that give rise to the background emission and targets of interest, absorption, and emission mechanisms of the intervening medium and those involved in the development of the sensor systems technology. The development effort is in the area of focal-plane-array technology, aperture synthesis and interferometry, image processing using advanced software algorithms, and space remote sensing of the earth's mesosphere. Traditionally, research in optical, IR, and radio astronomy has been a viable research area for the development of advanced applications of interest to the Navy and DoD. Substantial effort is devoted to developing applications in support of astrometry, precise time systems, and reference systems for the Navy.

Personnel

Full-time civilian: 34



Dr. K.J. Johnston

Key Personnel

Name	Title	Code
Dr. K.J. Johnston	Director	4030
Vacant	Deputy Director	4031
Vacant	Administrative Officer	4032
Dr. P.R. Schwartz	Head, Radio/IR/Optical Sensor Branch	4033
Dr. S.A. Mango	Head, Imaging Systems and Research Branch	4034

Point of contact: Dr. Kenneth J. Johnston, Code 4030, 767-2351

Space Science Division
Code 4100

Research Activity Areas

Atmospheric Physics
Boundary layer and electro-optics meteorology; aerosol and cloud atmospheric electricity

X-ray Astronomy
X-ray observation, analysis, and theory of space astronomical sources

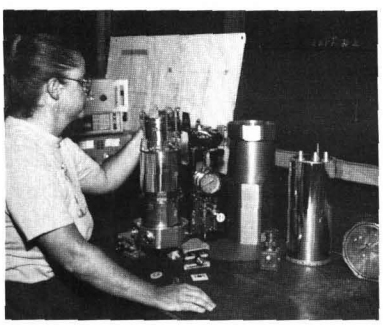
Ultraviolet Measurements
Ultraviolet astronomy; sensing/modeling of atmos/ionospheres

Gamma and Cosmic Ray Astrophysics
Gamma-ray astrophysics; solar-flare gamma-rays; space cosmic-ray particle environment

Solar Physics
Solar ultraviolet and visible light spectroscopy and photometry from rockets, satellites, and the Space Shuttle

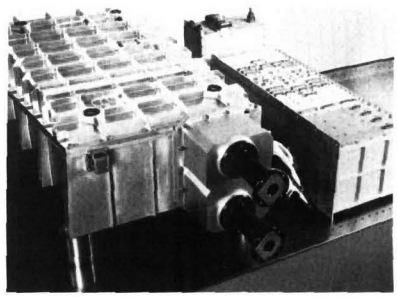
Solar-Terrestrial Relationships
Solar X-ray/EUV plasma diagnostics; coronal effects at Earth

Ionospheric Effects
Ionospheric propagation/modelling; prediction and assessment systems



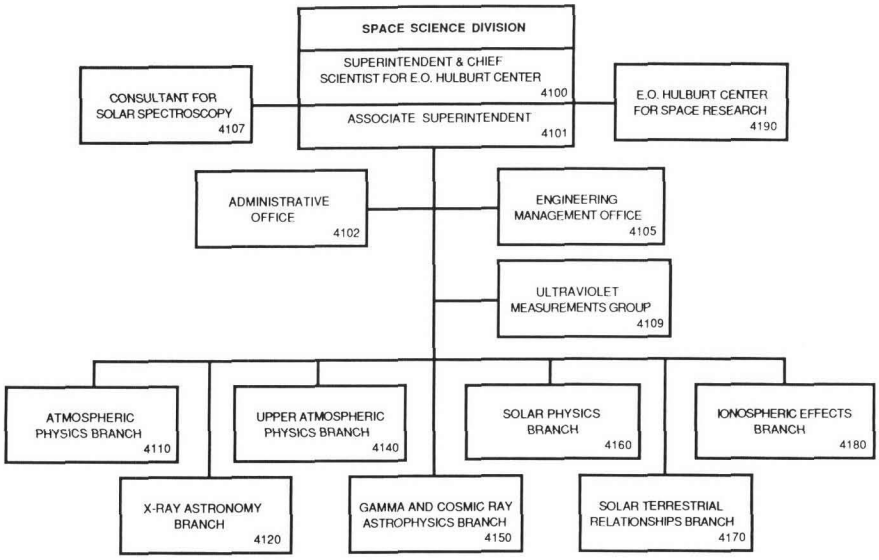
Radiation detectors, based on certain superconducting properties of materials that promise energy resolution 10 to 100 times better than existing semiconductor detectors, are being investigated in the specially instrumented cryostat shown here. Temperatures in the range 0.3 to 10 degrees Kelvin can be reached daily, and there are provisions for internal and external sources of radiation, as well as low-noise electronics. The initial emphasis is on detectors for X rays, but sensitivity in other wavelengths will also be explored.

The Remote Atmospheric and Ionospheric Detection System (RAIDS) is an array of eight optical instruments including imaging spectrographs, spectrometers, and photometers that will measure ionospheric and thermospheric airglow emissions at wavelengths from 50 to 870 nm over the altitude range 75 to 750 km on the earth's limb. RAIDS, which is a proof-of-concept for future ionospheric weather sensors, will fly aboard the NOAA J weather satellite.



The Solar Ultraviolet Spectral Irradiance Monitor (SUSIM) instrument will fly on the Upper Atmospheric Research Satellite (UARS) scheduled to be launched in September 1991; it will measure the total solar irradiance in the wavelength region of 200 to 400 nm.

Dr. H. Gursky



Basic Responsibilities

The Space Science Division conducts research in the fields of astronomy and astrophysics, solar-terrestrial physics, and atmospheric science. Satellites, rockets, and ground-based facilities are used to obtain information on radiation from the sun and celestial sources, and to study the behavior of the ionosphere and high atmosphere. Research results are of importance to radio communications, to use of the space environment, to weather prediction, and to the fundamental understanding of natural radiation and geophysical phenomena. The Superintendent also acts as Chief Scientist of the E.O. Hulburt Center for Space Research, created to provide research opportunities in space science to appointees from universities.

Personnel

Full-time civilian: 122

Key Personnel

Name	Title	Code
Dr. H. Gursky	Superintendent/Chief Scientist, E. O. Hulburt Center for Space Research†	4100
Dr. R.G. Groshans	Associate Superintendent	4101
Mrs. C.J. Marks	Administrative Officer	4102
Mr. J. Vrancik	Engineering Management Officer	4105
Dr. R. Tousey	Consultant (Emeritus)	4107
Dr. G. Carruthers	Head, Ultraviolet Measurement Group	4109
Dr. L. Ruhnke	Head, Atmospheric Physics Branch	4110
Mr. G.G. Fritz	Head, X-Ray Astronomy Branch	4120
Dr. R.R. Meier	Head, Upper Atmospheric Physics Branch	4140
Dr. J.D. Kurfess	Head, Gamma and Cosmic Ray Astrophysics Branch	4150
Dr. G.E. Brueckner	Head, Solar Physics Branch	4160
Dr. G.A. Doschek	Head, Solar Terrestrial Relationships Branch	4170
Dr. J.M. Goodman	Head, Ionospheric Effects Branch	4180
Dr. H. Friedman	Chief Scientist (Emeritus), E. O. Hulburt Center for Space Research	4190

Point of contact: Mrs. Carolyn J. Marks, Code 4102, 767-3631

†Additional duty

Laboratory for Computational Physics and Fluid Dynamics

Code 4400

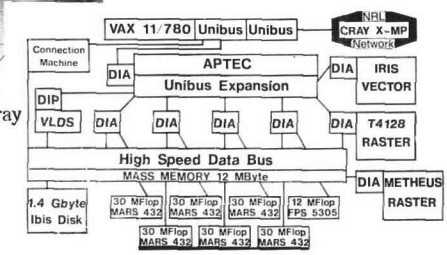
Research Activity Areas

Reactive Flows
- Fluid dynamics in combustion
- Turbulence in compressible flows
- Multiphase flows
- Molecular dynamics
- Theoretical quantum chemistry

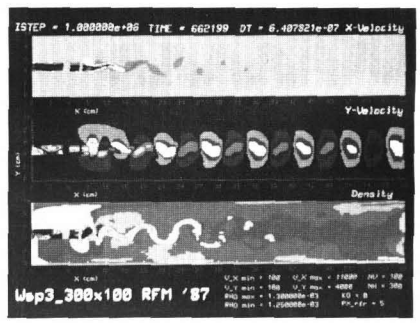
Fluid Structure Interaction
- Boundary layer hydrodynamics
- Marine hydrodynamics
- Computational hydrodynamics
- Hydro-acoustics

Applied Hydrodynamics
- Turbulent jets and wakes
- Nonlinear and breaking ocean waves
- Stratified flows
- Turbulence modeling

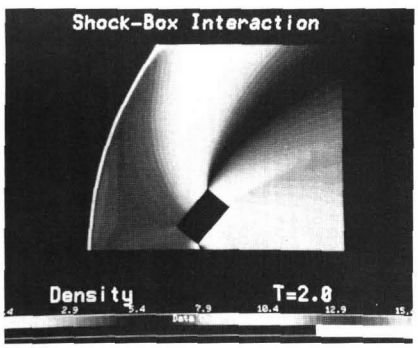
Computational Physics Developments
- Laser plasma interactions
- Inertial confinement fusion
- Solar physics modeling
- Dynamical gridding algorithms
- Advanced graphical and parallel processing systems



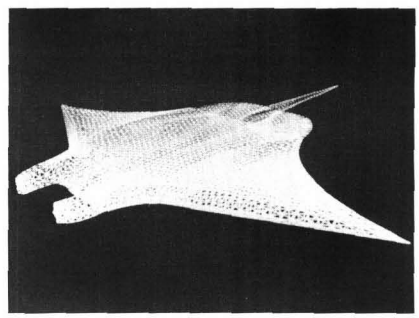
)rking at the LCP Graphical Array Processing System (GAPS)



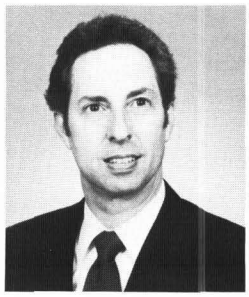
VOYEUR presentation of horizontal velocity (top), vertical velocity (middle), and density (bottom) in a 2D simulation of vortex shedding behind a bluff body. The simulation on this 300 × 100 finite difference grid was carried to 1,000,000 timesteps on GAPS.



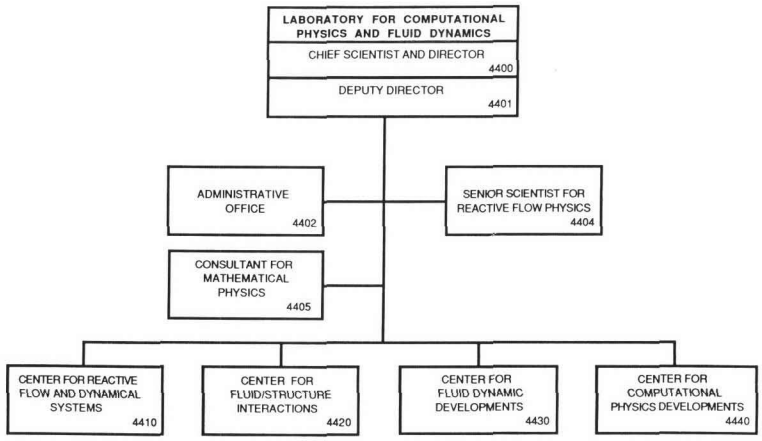
Cray computation of a Mach 10 shock hitting a solid box from the left. New techniques developed to resolve complex geometries and complex flows allow the geometry to change during a simulation. The box has nearly overturned due to the unbalanced pressure of the shock.



Undersea propulsion in nature is generally of two types, anguliform motions with the entire body deforming as in eels, and carangiform motions, which involve flapping of a tail or waving of wings such as in dolphins and manta rays. Manta rays, due to their similarity to aircraft, are a good starting point for studying carangiform vehicles. The figure shows a manta ray gridded for a numerical simulation.



Dr. J.P. Boris



Basic Responsibilities

The Laboratory for Computational Physics and Fluid Dynamics is responsible for the research leading to and the application of advanced analytical, numerical, and experimental capabilities that are relevant to Navy, DOD, and other programs of national interest. This research is pursued in the fields of compressible and incompressible fluid dynamics, reactive flows, fluid/structure interaction including submarine and aerospace applications, atmospheric and ocean geophysics, magnetoplasma dynamics for laboratory and space applications, and in other disciplines of continuum and quantum computational physics as required to further the overall mission of the Naval Research Laboratory. The specific objectives of the Laboratory for Computational Physics and Fluid Dynamics are: to develop and maintain state-of-the-art analytic, computational, and experimental capabilities in fluid dynamics and related fields of physics; to establish in-house expertise in parallel processing for large-scale scientific computing; to perform analyses, computations, and experiments on specific relevant problems using these capabilities; and to transfer this technology to new and ongoing projects through cooperative programs with the research divisions at NRL and elsewhere.

Personnel

Full-time civilian: 38

Key Personnel

Name	Title	Code
Dr. J.P. Boris	Chief Scientist and Director	4400
Dr. W.C. Sandberg	Deputy Director	4401
Mrs. C. Adams	Administrative Officer	4402
Dr. E.S. Oran	Senior Scientist for Reactive Flow Physics	4404
Dr. D.L. Book	Consultant for Mathematical Physics	4405
Dr. K. Kailasanath	Head, Center for Reactive Flow and Dynamical Systems	4410
Dr. O.M. Griffin	Head, Center for Fluid/Structure Interactions	4420
Dr. T.F. Swean, Jr.	Head, Center for Fluid Dynamic Developments	4430
Mr. J.H. Gardner, Jr.	Head, Center for Computational Physics Developments	4440

Point of contact: Mrs. C. Adams, Code 4402, 767-6581

Condensed Matter and Radiation Sciences Division
Code 4600

Research Activity Areas

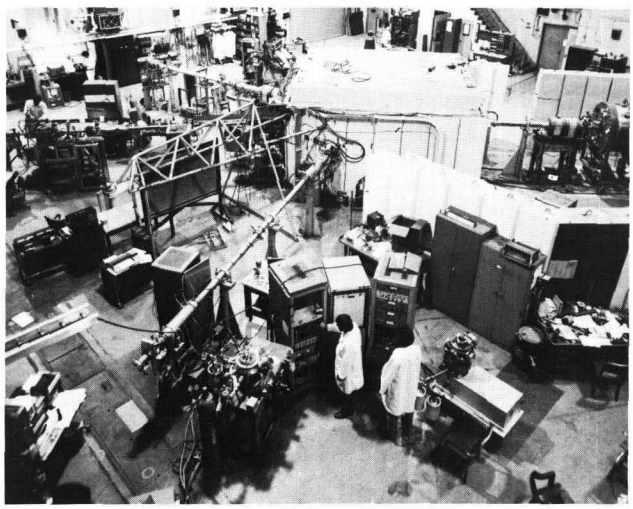
Radiation Effects
- Satellite survivability
- Single event upsets
- Device and material damage and hardening
- Ultrafast charge collection
- Space experiments
- Nuclear radiation detection
- 60-MeV LINAC

Directed Energy Effects
- Interaction of laser and microwave radiation with materials and systems
- Interaction of particle beams with materials
- Radiation transport calculations
- Energetic radiation applications
- Molecular collisions
- Lethality assessment

Surface Modification
- Modification of surfaces by ion implantation and ion activated deposition
- Radiation effects from high energy, charged particle beams
- Crystal studies by channeling techniques
- Sputtering by high-energy ions
- 200-kV ion implantation systems
- 3-MV tandem ion accelerator

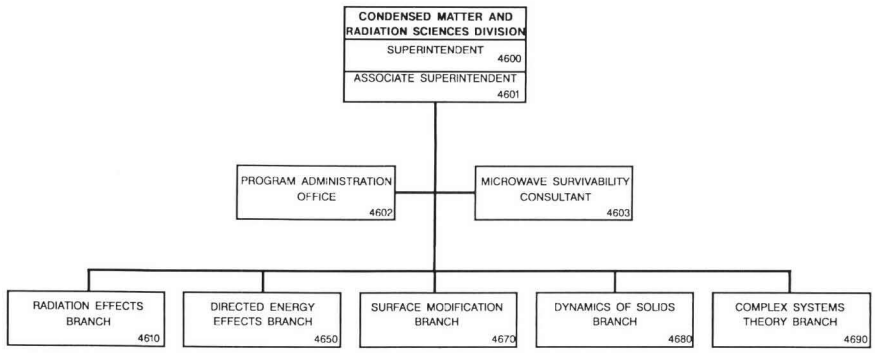
Dynamics of Solids
- X-ray sources, optics, and detectors
- X-ray analysis of materials
- Plasma spectroscopy
- Synchrotron radiation applications
- Phase transformations
- Shock Physics
- Hypervelocity impact
- Radiation effects in microelectronics
- Synchronized laser facility

Complex Systems Theory
- Solid-State Supercomputing
- Electronic structure theory
- Molecular dynamics
- Defect and cluster computations
- Theory of alloys



An elevated view showing the NRL 3 MeV Tandem Van de Graaff Accelerator and associated beam lines

Dr. D. J. Nagel



Basic Responsibilities

The Condensed Matter and Radiation Sciences Division conducts a broad program of basic and applied research on the fundamental properties of materials and on the interactions of various types of radiation with matter. Physical properties of condensed matter are investigated theoretically and experimentally as well as by various radiation probes. Damage produced by radiation, ranging from laser and X-ray beams through charged and neutral particle beams in the megavolt region, is studied. Techniques to use radiation for beneficial modification of materials are also developed. Radiations of military significance are studied and simulated in the laboratory by various radiation facilities maintained and operated by the Division primarily for DoD users.

Personnel

Full-time civilian: 100

Key Personnel

Name	Title	Code
Dr. D.J. Nagel	Superintendent	4600
Dr. G.P. Mueller*	Associate Superintendent	4601
Ms. B. Murphy	Head, Program Administration Office	4602
Dr. J.W. Butler	Microwave Survivability Consultant	4603
Mr. J.C. Ritter	Head, Radiation Effects Branch	4610
Dr. D.J. Nagel*	Head, Directed Energy Effects Branch	4650
Dr. F.A. Smidt	Head, Surface Modification Branch	4670
Dr. M.N. Kabler	Head, Dynamics of Solids Branch	4680
Dr. B.M. Klein	Head, Complex Systems Theory Branch	4690

Point of contact: Ms. B. Murphy, Code 4602, 767-3407

*Acting

Plasma Physics Division
Code 4700

Research Activity Areas

High-Power Electromagnetic Radiation
- Application of high-current relativistic electron beams to microwave and millimeter wave generation, e.g., gyrotrons, short-pulse FEL, and CARM
- Electron accelerators
- Plasma microwave electronics

Laser Plasma
- Laser-plasma interaction
- Laser fusion
- Laser-plasma diagnostics
- Laser-driven X-ray lasers
- KrF laser development
- Strongly coupled plasmas

Plasma Radiation
- Pulsed-power radiation source and power-flow development
- X-ray laser modeling
- Dense plasma atomic structure, processes, and equations of state
- Radiation hydrodynamics of dense Z-pinches and laser-produced plasmas
- Plasma-radiation diagnostics

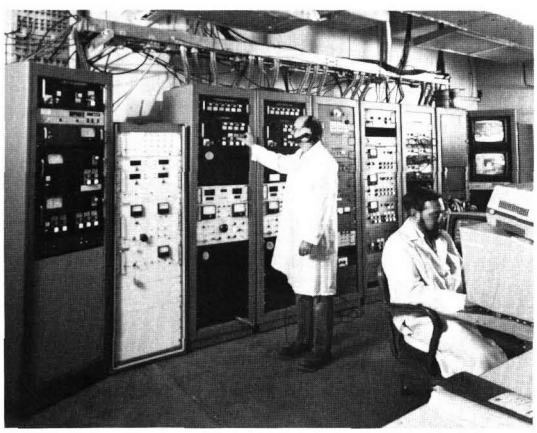
Beam Physics
- Modified betatron accelerator
- Rebatron accelerator
- High-quality electron beams
- Wake field accelerators

Pulsed Power Physics
- Production of intense relativistic electron beams
- Electron beam propagation and focusing
- Pulse-power-driven X-ray lasers
- Generation of intense ion beams
- Inductive energy storage

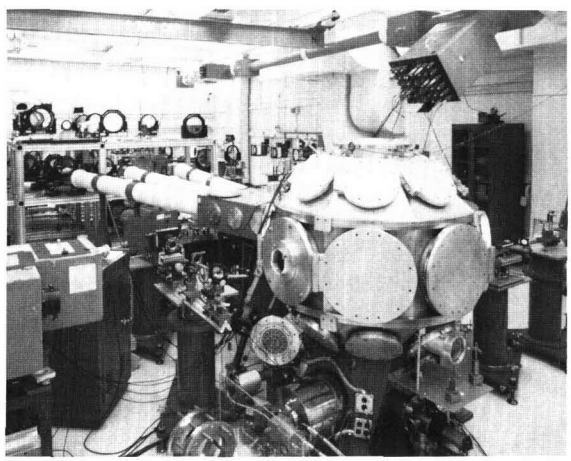
Space Plasma Physics
- Theoretical and numerical simulation of ionospheric and magnetospheric phenomena
- High-altitude, nuclear weapons effects on the ionosphere/magnetosphere
- Ionospheric-magnetospheric coupling
- Rocket, satellite, and shuttle-borne natural and active experiments
- Laboratory simulation of space plasma processes
- Solar-plasma processes

Plasma Theory
- Numerical simulation of high-density plasmas
- Theoretical study of nonlinear plasma dynamics
- Production and propagation of high-energy charged particle beams
- Radiation source development
- FEL theory

Charged Particle Physics
- Charged particle beam generation and propagation
- Plasma channels in air
- Experimental study of plasma chemistry
- Dense Z-Pinch
- Applications of modulated electron beams

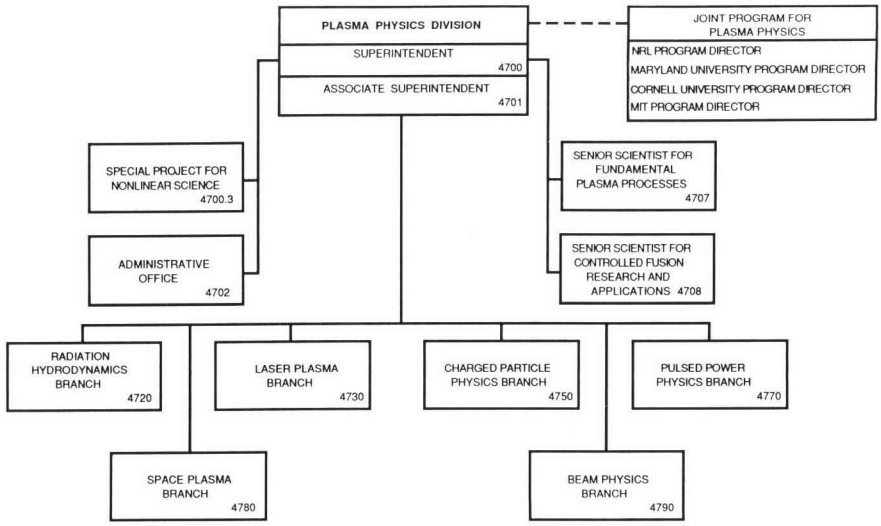


Control system of the modified betatron accelerator. The NRL modified accelerator is a device to generate low emittance, high energy, high current electron beams. Innovatives developments of betatron will help revoluntionize accelerator technology.



This is the target chamber of the Pharos III laser facility. Pharos III is a three-beam Nd:glass laser that can produce a kilojoule of energy in a few nanoseconds. When the light is focused onto a target, temperatures of 10 to 100 million degrees can be easily produced. The facility is being used to simulate high-altitude nuclear weapons effects, to study the physics of inertial confinement fusion, and to develop new X-ray lasers.

Dr. S.L. Ossakow



Basic Responsibilities

The Plasma Physics Division conducts a broad theoretical and experimental program of basic and applied research in plasma physics, laboratory and space plasmas, intense electron and ion beams, atomic physics, pulsed power sources, and laser physics. The effort of the Division is concentrated on a few closely coordinated theoretical and experimental programs. Considerable emphasis is placed on large-scale numerical simulations related to plasma dynamics; ionospheric, magnetospheric, and atmospheric dynamics; the effects of high-altitude nuclear weapons on the atmosphere; thermonuclear plasma confinement; atomic physics; and relativisitic electron beam propagation. Areas of experimental interest include: relativistic electron beams, laser-matter interaction, thermonuclear fusion, electromagnetic wave generation, the generation of intense ion beams, advanced accelerator development, inductive energy storage, the interaction of charged particle beams with the atmosphere, and in-situ space plasma measurements.

Personnel

Full-time civilian: 125

Key Personnel

Name	Title	Code
Dr. S.L. Ossakow	Superintendent	4700
Dr. V.L. Patel	Associate Superintendent	4701
Dr. P. Palmadesso	Head, Special Project for Nonlinear Science	4700.3
Ms. T. Mason	Administrative Officer	4702
Dr. W. Manheimer	Senior Scientist, Fundamental Plasma Processes	4707
Dr. A.E. Robson	Senior Scientist, Controlled Fusion Research & Applications	4708
Dr. J. Davis	Head, Radiation Hydrodynamics Branch	4720
Dr. S. Bodner	Head, Laser Plasma Branch	4730
Dr. R.A. Meger	Head, Charged Particle Physics Branch	4750
Dr. G. Cooperstein	Head, Pulsed Power Physics Branch	4770
Dr. B. Ripin	Head, Space Plasma Branch	4780
Dr. P. Sprangle	Head, Beam Physics Branch	4790

Point of contact: Dr. V.L. Patel, Code 4701, 767-2997

Technical Information Division

Code 4800 (old Code 2600)

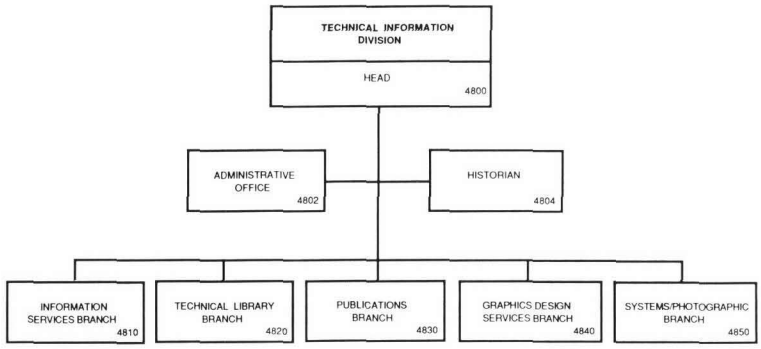
- **HISTORIAN**
- **INFORMATION SERVICES**
- **TECHNICAL LIBRARY**
- **MICROCOMPUTER SOFTWARE SUPPORT CENTER**
- **PUBLICATIONS**
- **PHOTOGRAPHIC SERVICES**
- **GRAPHIC DESIGN SERVICES**

Microcomputer Software Support Center features IBM-compatible and Macintosh user work station.

The graphic artists in the Graphic Design Services Branch design visuals and create artwork for NRL presentations and publications.

A full-service video/television production facility is available to produce professional-quality live and remote video technical reports. Complete editing, directing, and duplicating support are also available for video productions.

Mr. P. Imhof



Basic Responsibilities

The Technical Information Division provides centralized support to the Laboratory, and sometimes the Office of Naval Research, by collecting, retaining, processing, publishing, presenting, and distributing information in many forms to many audiences.

The Technical Information Division supports the Laboratory by editing and publishing reports and publications; by providing a full range of Library services, including the Microcomputer Software Support Center, specialized scientific and general photographic services, illustration and visual aid services, DICOMED support, scientific composition, special projects graphics, auditorium and meeting support, collection and maintenance of historical data, exhibits, video data-gathering services; by managing public and internal information programs (publishing *Labstracts*, NRL's biweekly newspaper, and programming NRL's television network (NTN)); and by conducting Freedom of Information Act activities, as required by law.

Personnel

Full-time civilian: 103

Key Personnel

Name	Title	Code
Mr. P. Imhof	Head, Technical Information Division	4800
Mrs. C. Uffelman	Administrative Officer	4802
Dr. D. van Keuren	Historian	4804
Mr. J.W. Gately, Jr.	Head, Information Services Branch and Public Affairs Officer†	4810
Ms. L. Stackpole	Head, Technical Library Branch	4820
Mr. T. Calderwood	Head, Publications Branch	4830
Ms. L. Jackson	Head, Graphic Design Services Branch	4840
Mr. J. Lucas	Head, Systems/Photographic Branch	4850

Point of contact: Mrs. C. Uffelman, Code 4802, 767-3370

†Additional Duty


Warfare Systems
and Sensors Research
Directorate

Warfare Systems and Sensors Research Directorate

Code 5000

The Warfare Systems and Sensors Research Directorate performs basic research and development for major generic Navy systems. The emphasis is on radar, electronic warfare, undersea warfare systems, and the integration of these primary sensors by communications and battle management systems. The Directorate conducts an extensive experimental program in the field, using both ship and aircraft platforms to support the above activities. Programs in ocean engineering, environmental factors, artificial intelligence, and calibration and standards for underwater acoustic devices are pursued in support of research and development for Navy systems. In addition, the Directorate has responsibility for providing specialized computing and computer networking on a Laboratory-wide basis.

Associate Director of Research for Warfare Systems and Sensors Research

Code 5000

Mr. R.R. Rojas

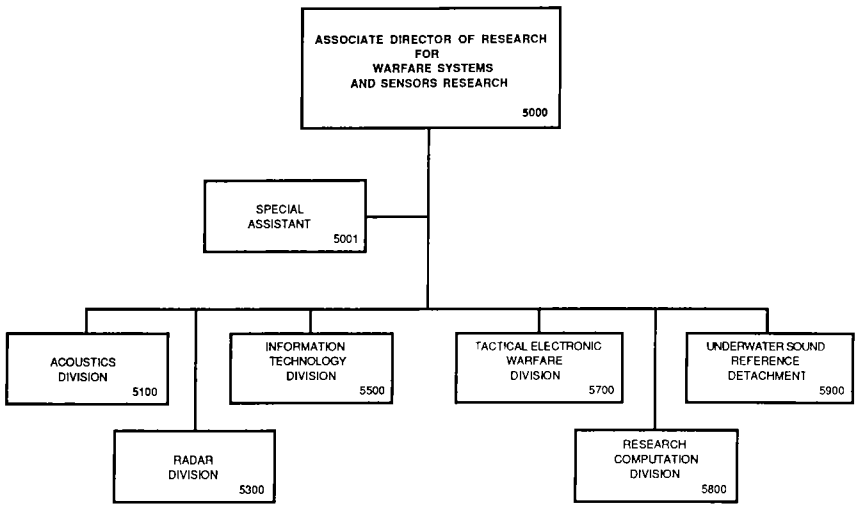
Mr. Rojas [redacted]. He attended City College of New York, where in 1952 he received a B.E.E. degree. In 1961, he received an M.E.E. degree from Drexel Institute of Technology, Philadelphia. Further graduate studies in mathematics and engineering were pursued at the University of Pennsylvania, Philadelphia.

From 1952 to 1960, Mr. Rojas was a project engineer in the Missile Department at Philco Corporation where he participated in the Talos, Terrier, and Tartar missile fuze programs and the Terrier missile guidance project. While at Philco, he received a company achievement award for his work on the design of specialized missile test equipment. From 1960 to 1969, he was manager of the Hydroacoustics Department at the Magnavox General Atronics Corporation. At General Atronics he was active in the area of signal processing techniques as applied to sonar, communication systems, and seismic detection systems.

In 1969, he joined the Naval Research Laboratory as Head of the Advanced Undersea Surveillance Program. In this capacity he was responsible for directing an experimental and theoretical program whose purpose was to evaluate and develop advanced surveillance systems for the Navy. Mr. Rojas served as Associate Director of Research and Director of Oceanology from 1977 until 1980, Associate Director of Systems Research and Technology Directorate from 1980 to 1986, and is currently Associate Director of the Warfare Systems and Sensors Research Directorate. Mr. Rojas also was on the graduate teaching staff at the Pennsylvania State University.

Mr. Rojas' research interests are centered on signal processing and the physics of underwater acoustic propagation, ambient noise, and reverberation.

Mr. Rojas is a member and Fellow of the Acoustical Society of America, Sigma Xi, the Institute of Electrical and Electronics Engineers, and the Association of Old Crows; he is also a charter member of the Marine Technology Society.



Key Personnel

Name	Title	Code
Mr. R.R. Rojas	Associate Director of Research for Warfare Systems and Sensors Research	5000
Mrs. B.L. Fleming	Special Assistant	5001
Dr. D.L. Bradley	Superintendent, Acoustics Division	5100
Dr. M.I. Skolnik	Superintendent, Radar Division	5300
Dr. R.P. Shumaker*	Superintendent, Information Technology Division	5500
Dr. J.A. Montgomery	Superintendent, Tactical Electronic Warfare Division	5700
Mr. R.F. Saegner	Head, Research Computation Division	5800
Dr. J.E. Blue	Superintendent, Underwater Sound Reference Detachment	5900

Point of contact: Mr. R.R. Rojas, Code 5000, 767-3294

*Acting

Acoustics Division

Code 5100

Staff Activities

Special programs management
Systems studies
System concepts and evaluation
Journal of Underwater Acoustics

Research Activity Areas

Marine Physics
- Geophysics
- Geology
- Oceanographic features that influence underwater acoustics

Applied Ocean Acoustics
- Airborne underwater acoustics
- Bottom-limited acoustics
- Arctic underwater acoustics
- Propagation
- Noise
- Ambient noise measurements and modeling
- Spectral estimation
- Signal processing

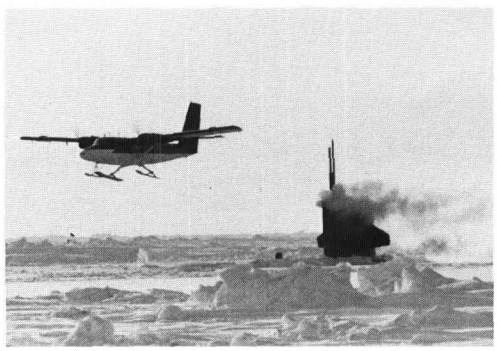
Physical Acoustics
- Structural acoustics
- Reflection, diffraction, scattering by bodies
- Target strength modeling
- Fiber-optic acoustic sensors
- Acoustics of coatings
- Hydrodynamic/acoustic interaction with elastic bodies

Signal Processing
- Tactical computers
- Signal processors
- Pattern recognition
- Processing methodology

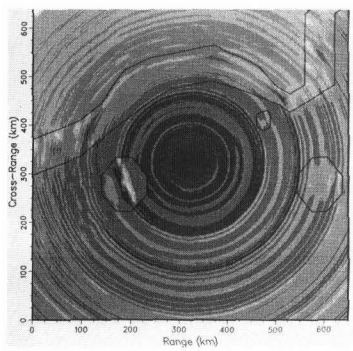
Acoustics Systems
- Propagation, coherence, and wave-front behavior
- Large-scale spatial and temporal integration
- Array deformation
- Low-frequency monostatic and multistatic reverberation
- Shallow-water acoustics
- Mode analysis
- Models of signal and noise fields
- Sensor fusion

Marine Systems
- Autonomous vehicle development
- Vehicle stability, control, and navigation
- Sensor research and development
- Adaptive sensor and control systems
- Scientific visualization

Ocean Dynamics
- Mesoscale, fine-structure, micro-structure variability
- Mixed layer and thermocline applications
- Ocean towed instrumentation techniques
- High resolution remote sensing

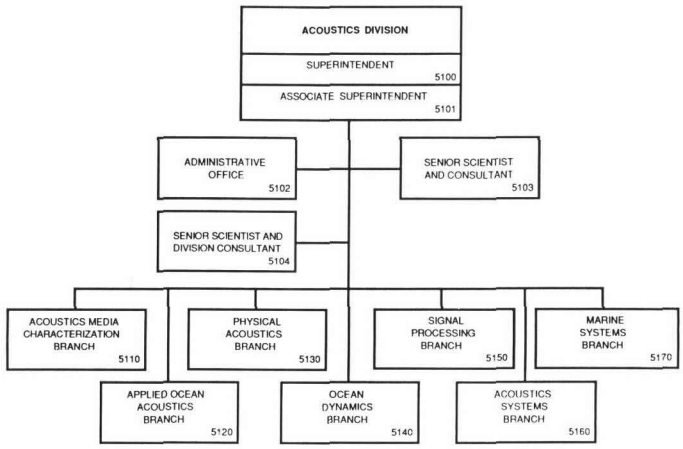


Arctic operations



Simulation of the radiation from a 50 Hz sound source at 100-m depth passing through the Gulf Stream

Dr. D.L. Bradley



Basic Responsibilities

The Acoustics Division conducts basic and applied research in undersea physics. The basic research areas are: signal processing; ocean acoustics and the associated description of the ocean environment as it impacts advanced systems; and physical acoustics. The applied spectrum includes: developing and proving system concepts; signal processing for active and passive detection, tracking and classification of underwater targets; echo strength; structural acoustics large area assessment techniques; and development of Processing Systems and techniques. Also included are basic and applied research in marine characteristics and technology for ocean applications. The Division program is interactive with the ONR Contract Research Program, NOARL, and other Navy laboratories, both U.S. and foreign. The Division is responsible for bringing the Connection Machine (a parallel processor computer) on-line as part of NRL's commitment to maintaining a state-of-the-art computational capability.

Personnel

Full-time civilian: 163

Key Personnel

Name	Title	Code
Dr. D.L. Bradley	Superintendent	5100
Dr. J.T. Warfield	Associate Superintendent	5101
Mrs. N.J. Beauchamp	Administrative Officer	5102
Dr. B.G. Hurdle	Senior Scientist and Consultant	5103
Dr. S. Hanish	Senior Scientist and Division Consultant	5104
Mr. H.S. Fleming	Head, Acoustics Media Characterization Branch	5110
Dr. O. Diachok	Head, Applied Ocean Acoustics Branch	5120
Dr. J. Bucaro	Head, Physical Acoustics Branch	5130
Mr. E.E. Rudd	Head, Ocean Dynamics Branch	5140
Mrs. E.E. Wald	Head, Signal Processing Branch	5150
Dr. L.B. Palmer	Head, Acoustic Systems Branch	5160
Mr. D. Steiger	Head, Marine Systems Branch	5170

Point of contact: Dr. D.L. Bradley, Code 5100, 767-3482

Radar Division
Code 5300

Staff Activities

Systems research
Electromagnetic propagation
Electromechanical design

Research Activity Areas

Radar Analysis
- Radar systems
- Target signature prediction
- Electromagnetics and antennas

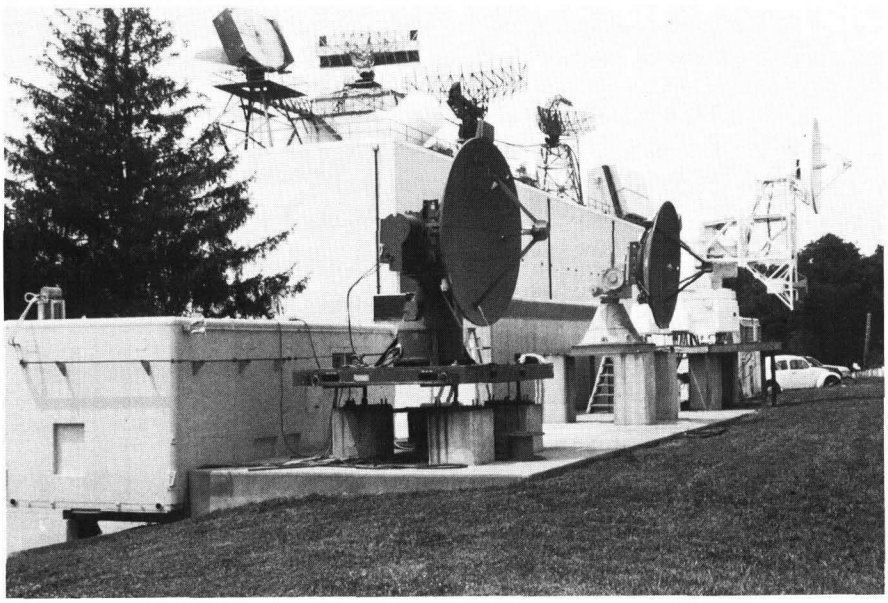
Radar Techniques
- High-frequency over-the-horizon radar
- Signal analysis
- Space-based radar

Search Radar
- Shipboard surveillance radar
- Precision tracking techniques
- Air traffic control

Target Characteristics
- Electronic counter-countermeasures
- Signal processing
- Target signature analysis

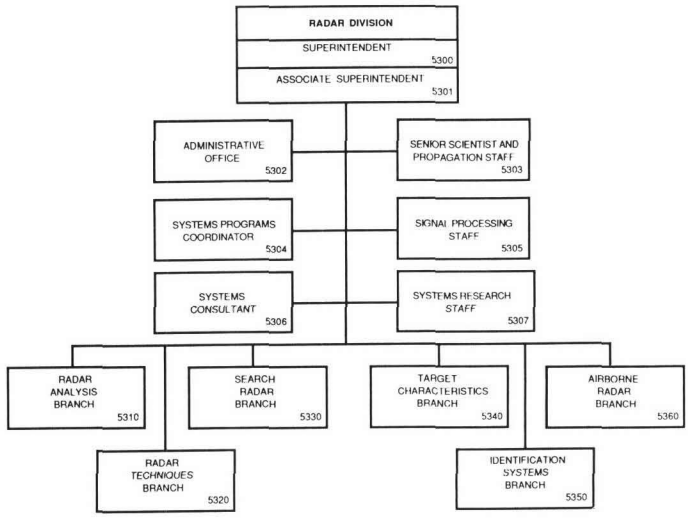
Identification Systems
- Mark XII IFF improvements
- NATO identification system (Mk XV)
- Future identification technology

Airborne Radar
- Airborne early-warning radar (AEW)
- Inverse synthetic aperture radar (ISAR)



Radar test site at Building 75, Chesapeake Bay Detachment (Chesapeake Beach, MD) showing radar antennas used in experimental development by the Radar Division. On the roof, from left to right: experimental back-to-back 2D/3D air surveillance radar test bed antennas; a directed mirror antenna (DMAR), a dual-frequency mirror-scan antenna with mechanically agile beam steering; antenna for Senrad, an experimental L-band system; and antennas for the SPS-49, SPS-10, IFF, SPS-40 and the fixed array surveillance radar (FASR) phased array. In the foreground from left to right: a high resolution X-band clutter radar (antenna and mount from the Marine Corp TPQ-27) with associated electronics van; the antenna and van for the Point Defense Demonstration Radar system; and the antenna for the high range resolution monopulse (HRRM) system.

Dr. M.I. Skolnik



Basic Responsibilities

The Radar Division conducts research on basic physical phenomena of importance to radar and related sensors, investigates new engineering techniques applicable to radar, demonstrates the feasibility of new radar concepts and systems, performs related systems analyses and evaluation of radar, and provides special consultative services. The emphasis is on new and advanced concepts and technology in radar and related sensors that are applicable to enhancing the Navy's ability to fulfill its mission.

Personnel

Full-time civilian: 150

Key Personnel

Name	Title	Code
Dr. M.I. Skolnik	Superintendent	5300
Mr. I.D. Olin	Associate Superintendent	5301
Mrs. C. Hill	Administrative Officer	5302
Dr. L.B. Wetzel	Senior Scientist and Head, Propagation Staff	5303
Mr. D.F. Hemenway	Systems Program Coordinator	5304
Mr. J.P. Letellier	Head, Signal Processing Staff	5305
Mr. J. Pavco	Systems Consultant	5306
Mr. C.E. Jedrey	Head, Systems Research Staff	5307
Dr. G.V. Trunk	Head, Radar Analysis Branch	5310
Mr. J.M. Headrick	Head, Radar Techniques Branch	5320
Dr. C.L. Temes	Head, Search Radar Branch	5330
Dr. B.H. Cantrell	Head, Target Characteristics Branch	5340
Mr. C.M. Veronda	Head, Identification Systems Branch	5350
Mr. T.L. apRhys	Head, Airborne Radar Branch	5360

Point of contact: Mr. I.D. Olin, Code 5301, 767-2089

Information Technology Division

Code 5500

Research Activity Areas

Navy Center for Applied Research in Artificial Intelligence
- Natural language understanding for message processing
- Natural language interfaces
- Automated fault diagnosis
- Expert systems for decision aids and consultation
- Machine learning
- Robotics software and computer vision

Communication Systems
- Network design
- Secure communication systems
- Modulation, coding, and waveform design
- Satellite communication system technology
- Distributed simulation and prototyping

Human-Computer Interaction (HCI) Laboratory
- Matching interface style with applications
- Devices/techniques for HCI
- Voice processing (synthesis, recognition, transmission, etc.)
- Man-in-loop interface evaluation

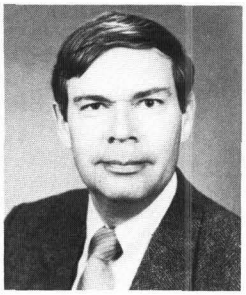
Center for Secure Information Technology
- Security architecture
- Formal proofs of system security
- COMSEC application technology
- Secure networks
- Software engineering for secure systems
- Key management and distribution

Transmission Technology
- Arctic communication
- Submarine communication technology
- Communication system architecture
- Communication antenna/propagation technology
- Signal processing for high-frequency intercept system

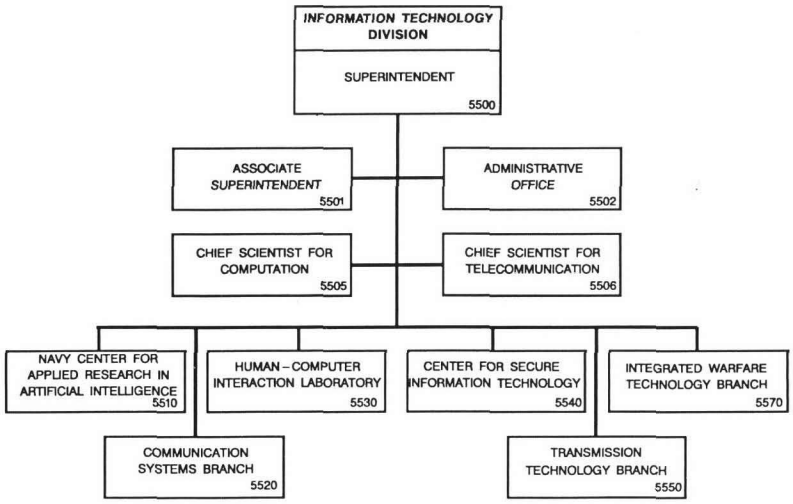
Integrated Warfare Technology
- Command decision support
- Parallel computing
- Battle management/C^3
- Data fusion technology
- Database management technology
- Real-time parallel processing
- Distributed simulation

NRL scientists participate in yearly ICEX field test conducted in the Arctic. The goal of this work is to better understand the processes that limit the performance of communication channels having strategic value in this important geographic region.

The Navy Center for Applied Research in Artificial Intelligence is engaged in research and development designed to address the application of artificial intelligence technology and techniques to critical Navy and national problems.



Dr. R.P. Shumaker



Basic Responsibilities

The Information Technology Division conducts research and development programs in the collection, transmission, and processing of information to provide a basis for improving the conduct of military operations. The organization of the Division is directed toward addressing the technologies and subsystems necessary to develop architectures and system designs for the next-generation battle-force warfare systems.

Personnel

Full-time civilian: 157

Key Personnel

Name	Title	Code
Dr. R.P. Shumaker*	Superintendent	5500
Mr. W.D. Long	Associate Superintendent	5501
Ms. J. Saunders	Administrative Officer	5502
Mr. S.H. Wilson	Chief Scientist for Computation	5505
Mr. D.I. Himes	Chief Scientist for Telecommunication	5506
Mrs. L.C. Davis*	Director, Navy Center for Applied Research in Artificial Intelligence	5510
Mr. E.L. Althouse	Head, Communication Systems Branch	5520
CDR R.C. Carter	Head, Human-Computer Interaction Laboratory	5530
Mr. D.I. Himes	Director, Center for Secure Information Technology	5540
Mr. E.J. Kennedy	Head, Transmission Technology Branch	5550
Mr. M.S. McBurnett	Head, Integrated Warfare Technology Branch	5570

Point of contact: W.D. Long, Code 5501, 767-2954

*Acting

Tactical Electronic Warfare Division

Code 5700

Staff Activities

Long-range EW strategic planning
Lead laboratory coordinating
Communications CM Group
Central Target Simulator Program
Effectiveness of Naval EW Systems (ENEWS)
Special Facilities Development Group

Research Activity Areas

Off-Board Countermeasures
- Expendable technology
- Expendable devices
- Off-board systems
- Decoys

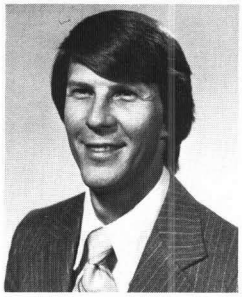
Airborne Electronic Warfare Systems
- Air systems development
- Penetration aids
- Power source development
- Jamming and deception
- Millimeter-wave technology

Ships Electronic Warfare Systems
- Ships systems development
- Jamming technology
- Deception techniques
- EW antennas
- Threat simulators

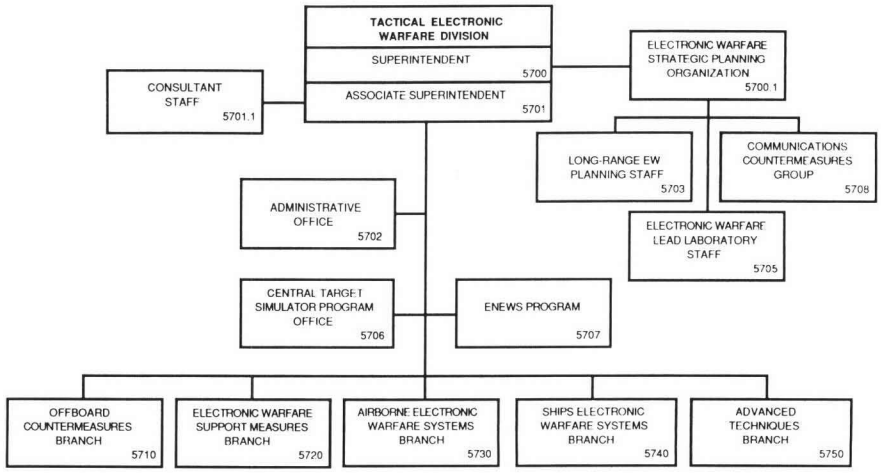
Electronic Warfare Support Measures
- Intercept systems and direction finders
- RF signal simulators
- Systems integration
- Command and control interfaces
- Signal processing

Advanced Techniques
- Analysis and modeling simulation
- New EW techniques
- Experimental systems
- EW concepts
- Infrared technology

The Tactical Electronic Warfare Division is housed in the newly enlarged Building 210. This facility contains many special laboratories to support research and development of countermeasures against communication, radar, and IR threats.



Dr. J.A. Montgomery



Basic Responsibilities

The Tactical Electronic Warfare Division (TEWD) is responsible for research and development in support of the Navy's tactical electronic warfare requirements and missions. These include electronic warfare support measures, electronic countermeasures, and supporting counter-countermeasures, as well as studies, analyses, and simulations for determinating and improving the effectiveness of these systems.

Personnel

Full-time civilian: 232

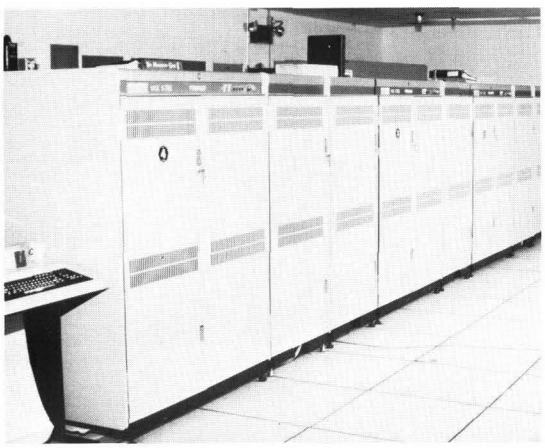
Key Personnel

Name	Title	Code
Dr. J.A. Montgomery	Superintendent	5700
Mr. H.W. Zwack	Associate Superintendent/Head, Consultant Staff	5701/5701.1
Dr. C.H. Heider	Head, Electronic Warfare Strategic Planning Organization	5700.1
Mr. D.M. Swann	Administrative Officer	5702
Dr. C.H. Heider	Head, Long-Range EW Planning Staff	5703
Vacant	Head, Electronic Warfare Lead Laboratory Staff	5705
Mr. A.A. Di Mattesa	Manager, Central Target Simulator Program Office	5706
Mr. D.F. Grady	Manager, ENEWS Program	5707
Mr. W.W. Everett	Head, Communications Countermeasures Group	5708
Dr. F.J. Klemm	Head, Offboard Countermeasures Branch	5710
Mr. T. Jones	Head, Electronic Warfare Support Measures Branch	5720
Mr. J.C. Constantine	Head, Airborne Electronic Warfare Systems Branch	5730
Mr. H.E. Crecraft	Head, Ships Electronic Warfare Systems Branch	5740
Dr. G.E. Friedman	Head, Advanced Techniques Branch	5750

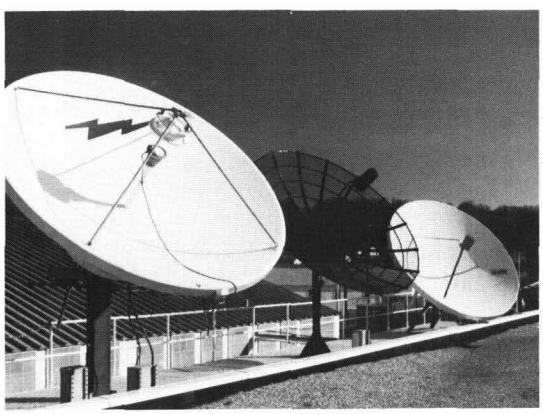
Point of contact: Mr. H.W. Zwack, Code 5701, 767-3622

Research Computation Division
Code 5800 (old Code 2800)

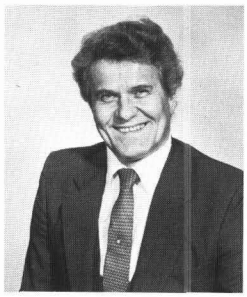
The Cray X-MP/216 multiprocessor supercomputer provides very high-speed vector and scalar processing with a peak processing speed of 488 million floating-point operations per second (MFLOPS) with a sustainable speed of 105 MFLOPS per processor



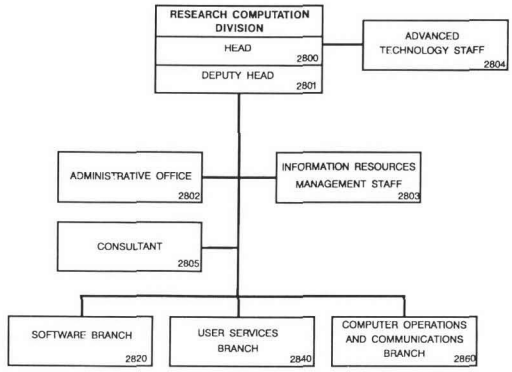
These four VAX 11/785s provide access to the Cray X-MP/216 from NRL's local area network and the Defense Data Network, thus providing access from terminals, PCs, minicomputers, workstations, and other computers throughout the country



Satellite dishes provide video reception for NICENET; including news, weather, seminars, and training programs



Mr. R.F. Saenger



Basic Responsibilities

The Research Computation Division (RCD) provides a wide variety of computing and networking services to more than 1700 scientists, analysts, and engineers at NRL/ONR throughout the United States and at remote locations from London to Tokyo. These services include high-volume, time-shared, local and remote batch processing, interactive graphics, telecommunications processing, and user support.

The RCD manages and operates NRL's Central Computing Facility (CCF), a totally integrated computer system consisting of a Cray X-MP/216 multiprocessor with its associated support equipment, and a high-speed network of Digital Equipment Corporation VAX 785 plus VAX 8350 computer systems that facilitate communications between the user community and the CCF. The Cray is the fastest computer manufactured in the United States. Both local and remote users access the CCF through their host computers (including personal workstations) or by terminals. The RCD also manages and operates the NRL Integrated Communications Environment Network (NICENET), which is the local area network for NRL. NICENET encompasses data and video services as well as gateways to networks and computer systems worldwide (e.g. Internet, DDN/MILNET, SURANET/NFSNET, USAN, SPAN).

The RCD also provides appropriate ADP technical logistic support services for NRL; identifies ADP requirements and may secure and administer contractual ADP support services; and supports the Navy Laboratory Computing Committee and the Navy Laboratory Computer Network. The Head of the RCD; by additional duty assignment, is the OCNR Special Assistant for Information Resources Management.

Personnel

Full-time civilian: 54

Key Personnel

Name	Title	Code
Mr. R.F. Saenger	Head, Research Computation Division	5800
Ms. D.E. Gossett	Deputy Head	5801
Ms. B.M. Thomas	Administrative Officer	5802
Mr. V.A. Allen	Head, Information Resources Management Staff	5803
Mr. R.F. Saenger*	Head, Advanced Technology Staff	5804
Mr. H.K. Brock	Head, Consultant Staff	5805
Mr. G.E. Perez	Head, Software Branch	5820
Ms. H.K. Howell	Head, User Services Branch	5840
Mr. J.N. Lockard	Head, Computer Operations and Communications Branch	5860

Point of contact: Mr. Rudi F. Saenger, Code 5800, 767-2751

*Acting

Underwater Sound Reference Detachment
Code 5900

Research Activity Areas

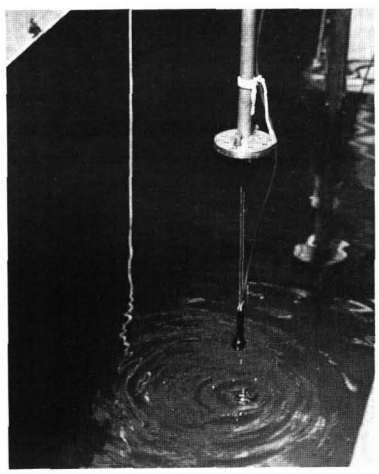
Measurements
- Calibration theory and accuracy
- Measurement methods
- Standard calibration services
- Sonar transducer test and evaluation
- Transduction and radiation theory
- Wavenumber calibration
- Explosive shock testing

Acoustical Systems
- Computation services
- Digital systems
- Analog systems
- Signal analysis
- Low-noise preamplifiers
- Measurement systems

Acoustic Materials
- Polymers
- Transduction materials
- Adhesives
- Measurements
- Quality control
- Chemical analysis

Transducers
- Electroacoustic standards
- Acoustic sources
- Specialized electroacoustic transducers
- Transducer loan services
- Transducer reliability
- Sonar transducers
- Accelerated life testing
- Transducer modeling

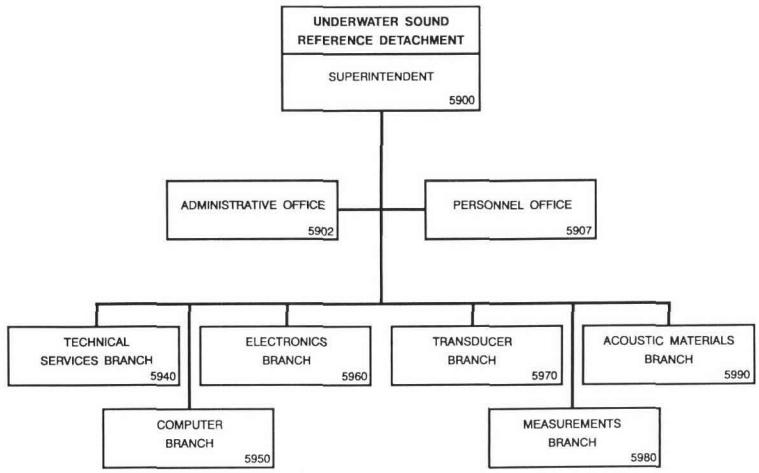
Chemistry laboratory where polymer materials used in underwater acoustical systems are developed and analyzed



A USRD standard F42C transducer being raised from a test well

Technician lowering the cover to the smaller of the two ports of entry/exit to the anechoic tank pressure vessel in preparation for a test. The tank is used to test various types of sonar transducers as a function of temperature and pressure.

Dr. J. E. Blue



Basic Responsibilities

The Underwater Sound Reference Detachment (USRD) serves as the principal Navy expert in the theory and practice of underwater sound measurements. Specialized facilities provide acoustic calibration and test and evaluation measurements for acoustic transducers and materials. These facilities can simulate actual ocean temperatures and pressures over a broad frequency range, allowing them to accommodate nearly all underwater acoustic devices. The USRD conducts research and development on the theory and design of underwater electroacoustic transducers and in developing analytical techniques and instrumentation for electrical, mechanical, and electroacoustic testing of transducers and transducer components. Research is also conducted in the area of materials used to generate, transmit, and absorb underwater sound. It is a link in the traceability of underwater sound measurements to the National Institute of Standards and Technology (formerly the National Bureau of Standards), supplying calibrated transducers for use in calibration and development of underwater acoustic weapons and sonar transducers. This provides greater uniformity, accuracy, and reliability in underwater acoustic measurement throughout the Navy and industry. The USRD participates in the establishment of Navy, national, and international standards for underwater acoustics.

Personnel

Full-time civilian: 113

Key Personnel

Name	Title	Code
Dr. J.E. Blue	Superintendent	5900
Dr. R.W. Timme†	Associate Superintendent	5901
Ms. D.A. Pieper	Head, Administrative Office	5902
Ms. N.L. Rose	Head, Personnel Office	5907
Mr. G.E. Woods	Head, Technical Services Branch	5940
Mr. R.E. Scott	Head, Computer Branch	5950
Mr. C.K. Brown	Head, Electronics Branch	5960
Dr. R.W. Timme	Head, Transducer Branch	5970
Dr. A.L. Van Buren	Head, Measurements Branch	5980
Dr. R.Y. Ting	Head, Acoustic Materials Branch	5990

Point of contact: Mrs. L.R. Jevnager, Code 5902, (407) 857-5237

†Additional duty

Materials Science and Component Technology Directorate

Materials Science and Component Technology Directorate

Code 6000

The Materials Science and Component Technology Directorate carries out a multidisciplinary research program whose objectives are the discovery and exploitation of new improved materials, the generation of new concepts associated with materials behavior, and the development of advanced components based on these new and improved materials and concepts. Theoretical and experimental research is carried out to determine the scientific origins of materials behavior and to develop procedures for modifying these materials to meet important naval needs for advanced platforms, electronics, sensors, and photonics. The program includes investigations of a broad spectrum of materials including insulators, semiconductors, superconductors, metals and alloys, optical materials, polymers, plastics, and artificially structured biomolecular materials and composites, which are used in important naval devices, components, and systems. New techniques are developed for producing, processing, and fabricating these materials for crucial naval applications.

The synthesis, processing, properties, and limits of performance of these materials in natural or radiation environments, components under deleterious conditions such as those associated with the marine environment, neutron or directed energy beam irradiation, or extreme temperatures and pressures, are established.

The directorate, through its Engineering Services Divison provides engineering, design, fabrication, assembly, and test of experimental research equipments in support of the Laboratory's research efforts.

Associate Director of Research
for Materials Science and Component Technology

Code 6000

Dr. B.B. Rath

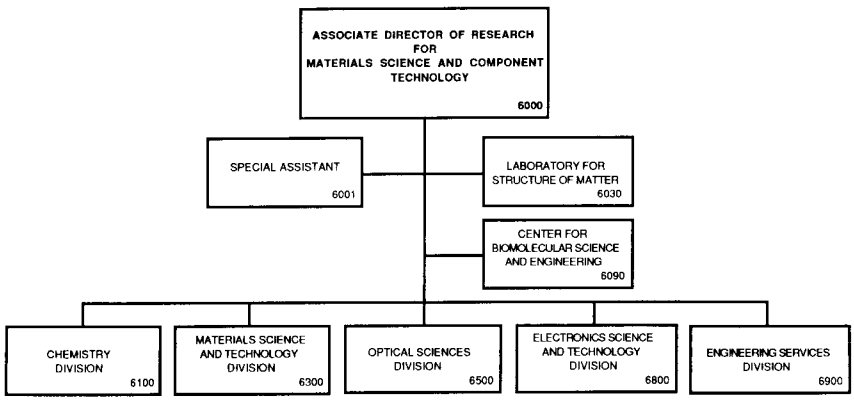
Dr. Rath [redacted] He received a B.S. degree in physics and mathematics from Utkal University, an M.S. in metallurgical engineering from Michigan Technological University, and a Ph.D. from the Illinois Institute of Technology.

Dr. Rath was Assistant Professor of Metallurgy and Materials Science at Washington State University from 1961 to 1965. From 1965 to 1972, he was with the staff of the Edgar C. Bain Laboratory for fundamental research of the U.S. Steel Corporation. From 1972 to 1976, he headed the Metal Physics Research Section of the McDonnell Douglas Research Laboratories, in St. Louis, Missouri, until he came to NRL as Head of the Physical Metallurgy Branch. During this period he was adjunct Professor at the Carnegie-Mellon University, the University of Maryland, and the Colorado School of Mines. Dr. Rath served as Superintendent of the Materials Science and Technology Division from 1982 to 1986, when he was appointed to his present position.

Dr. Rath is recognized in the fields of solid state transformations, grain boundary migrations, and structure-property relationships in metallic systems. He has published over 140 papers in these fields and edited several books and conference proceedings.

Dr. Rath serves on several planning, review, and advisory boards including the Department of Defense, Joint Directors of Laboratories, National Materials Advisory Board of the National Academy of Science, National Science Foundation, Carnegie-Mellon University, University of Virginia, and Colorado School of Mines. He is a member of the panel on Metals and Materials in Structures for The Technical Cooperation Program (TTCP) countries and the Indo-U.S. Joint Commission on Science and Technology.

Dr. Rath is a fellow of the American Society for Materials-International (ASM), Washington Academy of Sciences, a member of Sigma Xi, and The Metallurgical Society (TMS). He serves as a member of the Board of Directors of TMS, editorial board of international journals, and as chairman of several committees of TMS and ASM.



Key Personnel

Name	Title	Code
Dr. B.B. Rath	Associate Director of Research for Materials Science and Component Technology	6000
Mr. R.A. Gray	Special Assistant	6001
Dr. J. Karle	Chief Scientist, Laboratory for Structure of Matter	6030
Dr. J. Schnur	Head, Center for Bio/Molecular Science and Engineering	6090
Dr. J.S. Murday	Superintendent, Chemistry Division	6100
Dr. D.U. Gubser	Superintendent, Materials Science and Technology Division	6300
Dr. T.G. Giallorenzi	Superintendent, Optical Sciences Division	6500
Dr. G.M. Borsuk	Superintendent, Electronics Science and Technology Division	6800
Mr. L.A. Sentiger, Jr.	Officer, Engineering Services Division	6900

Point of contact: Mrs. Joyce Smithwick, Code 6000A, 767-3566

Laboratory for Structure of Matter

Code 6030

Basic Responsibilities

The Laboratory for Structure of Matter carries out experimental and theoretical investigations of the atomic, molecular, glassy, and crystalline structures of materials. The methods of X-ray, electron, and neutron diffraction are used in a broad program of structural studies that can form the basis for understanding and interpreting the results of research investigations in a wide variety of scientific disciplines. Structural investigations relate structure to function, facilitate industrial syntheses and the creation of new materials with improved properties, and provide foundation information for numerous associated disciplines and studies. Applications are made, for example, to propellants, explosives, dense energetic materials, absorptive carbons, metallic glasses, device materials, ion carriers, antibiotics, analgesics, reversible oxygen carriers, and synthetic reaction intermediates and final products.

Personnel

Full-time civilian: 12

Dr. J. Karle
Recipient of 1985 Nobel Prize in Chemistry

Key Personnel

Name	Title
Dr. J. Karle	Chief Scientist, Laboratory for Structure of Matter

Point of contact: Dr. Clifford George, Code 6030, 767-3463

Center for Bio/Molecular Science and Engineering

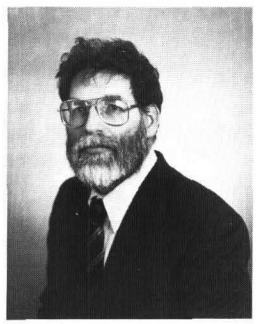
Code 6090

Basic Responsibilities

The Center for Bio/Molecular Science and Engineering conducts research in biotechnology aimed at solutions of problems for the Navy, Department of Defense, and the nation at large. Long-term research directions focus on complex bio/molecular systems and are aimed at gaining a fundamental understanding of the structures and functions of biologically-derived systems. The staff of the Center is an interdisciplinary team performing basic and applied research in a number of diverse areas including biochemistry, biophysics, synthesis, and thin-film fabrication. Because of the interdisciplinary nature of this work, most of the research being performed in the Center is of a collaborative nature. The Center Associate concept is a key way of establishing this collaboration. Center Associates come from other research areas within NRL as well as universities, industry, and other Government laboratories.

Personnel

Full-time civilian: 19



Dr. J.M. Schnur

Key Personnel

Name	Title
Dr. J.M. Schnur	Head, Center for Bio/Molecular Science & Engineering
Dr. B.P. Gaber	Deputy Head, Center for Bio/Molecular Science & Engineering
Dr. J.M. Calvert	High Resolution Patterning Program Manager
Dr. E.L. Chang	Archaebacteria Research Program Manager
Dr. T.L. Fare	Receptor Based Biosensor Program Manager
Dr. F.S. Ligler	Immuno/Bio Sensors Program Manager
Mr. R.R. Price	Tubule Based Antifouling Paint Program Manager
Dr. A.S. Rudolph	Blood Surrogate Program Manager
Dr. P.E. Schoen	ONT Tubule Based Materials Program Manager
Dr. A. Singh	Advanced Polymerizable Lipid Synthesis
Dr. R.B. Thompson	Fiber Optic Sensor Program Manager

Point of contact: Mrs. Cheri Schmidt, Code 6090A, 767-3557

Chemistry Division
Code 6100

Staff Activity

Fire Protection and Damage Control
Program Office

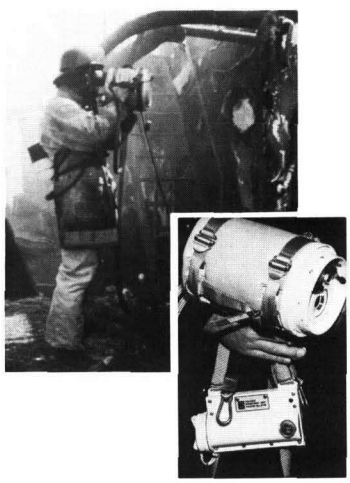
Research Activity Areas

Chemical Diagnostics
- Optical diagnostics of chemical reactions
- Kinetics of gas phase reactions
- Trace analysis
- Atmosphere analysis and control
- Ion/molecule processes
- Theoretical chemistry

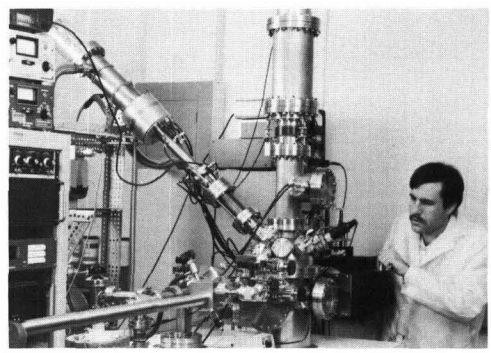
Polymeric Materials
- Synthesis and evaluation of innovative polymers
- Functional organic coatings
- Polymer characterization
- Superconducting materials
- Quality control methodology
- Degradation and stabilization mechanisms
- High-temperature resins
- OMCVD materials
- Corrosion prevention

Surface/Interface Chemistry
- Tribology
- Surface properties of materials
- Surface/interface analysis
- Chemical microdetectors
- IR/RF decoy materials
- Surface reaction dynamics
- High-temperature chemistry
- Fundamental chemistry
- Beam-enhanced chemistry

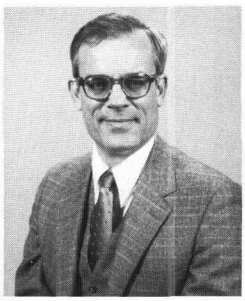
Combustion & Fuels
- Distillate fuels research
- Combustion dynamics
- Fire protection and suppression
- Personnel protection
- Modeling and scaling of combustion systems
- Chemical and biological defense
- Synthetic fuels
- Safety and survivability



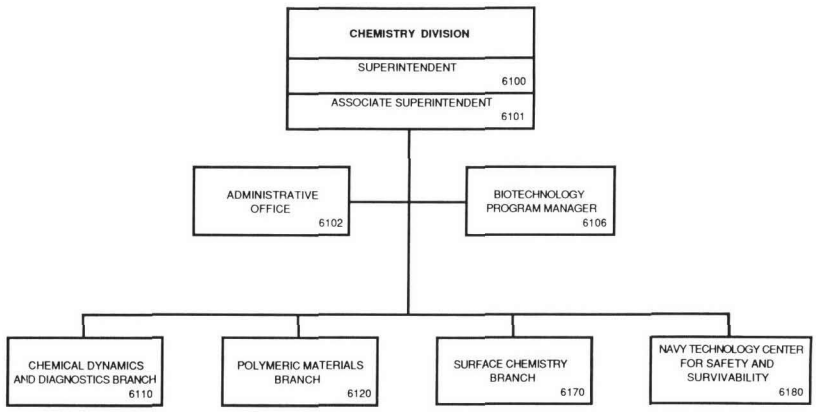
Navy combatant ships are now receiving Naval Firefighters Thermal Imagers (NFTIs) as a result of a 4-year evaluation and testing program conducted by NRL scientists. NFTI, which has already been used in one fire aboard an aircraft carrier, allows firefighters to immediately locate and extinguish a fire.



This state-of-the-art time-of-flight secondary ion mass spectrometer (SIMS), constructed at NRL, is one of only four in the world, and is the only one in the United States. It has the ability to analyze submonolayer thin films on surfaces with a demonstrated mass range of over 9000 amu and a mass resolution of 2000. It is successfully used for analyzing both organic and inorganic materials and can be applied to a wide range of both basic and applied research areas.



Dr. J. S. Murday

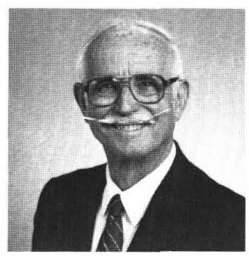


Basic Responsibilities

The Chemistry Division conducts basic and applied research and development studies in the broad fields of chemical diagnostics, polymeric materials, surface and electrochemistry, combustion, and fuels chemistry. Specialized programs within these fields include organic polymeric materials, coatings, dynamics, laser chemistry, electroactive polymers, tribology, physical and chemical characterization of surfaces and theory of surfaces, chemistry of electronic materials, submarine atmosphere analysis and control, lipid chemistry, membranes and novel structures, sensors, solution chemistry.

Navy Technology Center for Safety and Survivability

To enhance protection of Navy personnel and platforms from damage and injury in peace and wartime, the Center performs RDT&E on fire and personnel protection, fuels, chemical defense, submarine atmospheres, and damage control aspects of ship and aircraft survivability; supports Navy and Marine Corps requirements in these areas, and acts as a focus for technology transfer in safety and survivability.



Dr. H.W. Carhart

Personnel

Full-time civilian: 120

Key Personnel

Name	Title	Code
Dr. J.S. Murday	Superintendent	6100
Dr. W.B. Fox	Associate Superintendent	6101
Ms. B.L. Russell	Administrative Officer	6102
CAPT W.W. Schultz, USN	Biotechnology Program Manager	6106
Dr. J. McDonald	Head, Chemical Dynamics & Diagnostics Branch	6110
Dr. W.B. Moniz	Head, Polymeric Materials Branch	6120
Dr. J.S. Murday	Head, Surface Chemistry Branch	6170
Dr. H.W. Carhart	Head, Navy Technology Center for Safety and Survivability	6180

Point of contact: Ms. Brenda Russell, Code 6102, 767-2460

Materials Science and Technology Division

Code 6300

Research Activity Areas

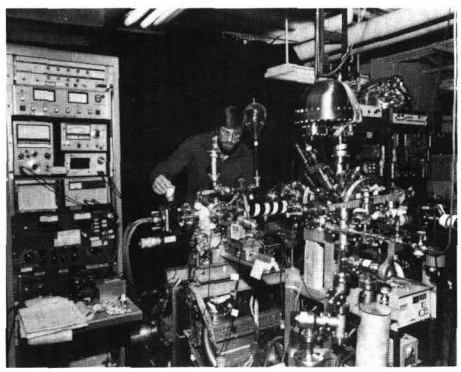
Materials Physics
- Superconductivity
- Magnetism
- Electronic properties
- Metallic film growth and characterization

Physical Metallurgy
- Phase transformations and defect states
- Microstructure-property relationships
- Elasticity, plasticity, mechanical phenomena
- Surface processing
- Alloy development
- Elevated temperature behavior of materials
- Rapid solidification processing of materials

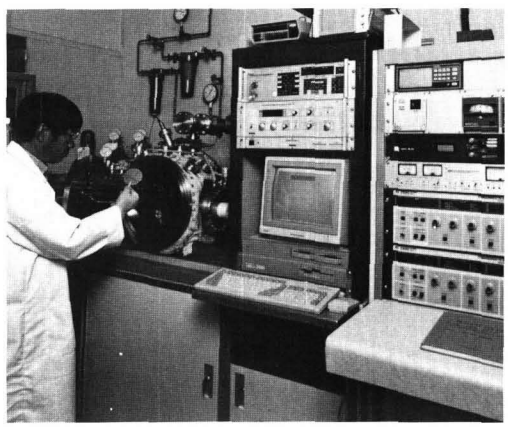
Mechanics and Structural Properties
- Micromechanisms of crack growth
- Subcritical crack growth and fracture
- Failure mechanisms and criteria
- Computational, fracture, and structural mechanics
- Constitutive theories
- Reliability analysis and failure modes of components and systems
- Nondestructive evaluation
- Performance and survivability
- Elevated temperature materials

Composites and Ceramics
- Processing, fabrication, and microstructural characterization
- Thermostructural applications
- Ceramics for electronic, piezoelectric, optical, and other nonmechanical applications
- Physical, mechanical, and failure characterization and analysis

Environmental Effects
- Microstructural characterization
- Influence of environment on high-temperature materials
- Corrosion science and mechanisms
- Stress corrosion cracking
- Surface protection and inhibitors
- Marine corrosion

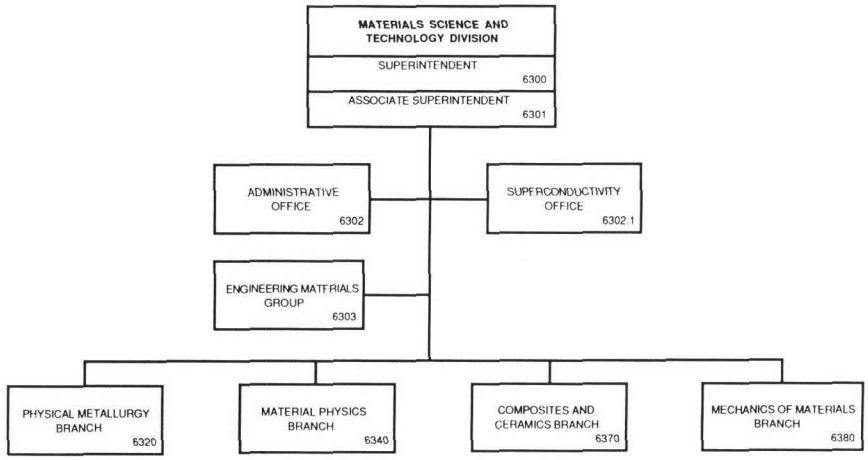


The growth of single crystal magnetic films on semiconductor substrates for electronics applications is observed.



System for plating metallic materials onto graphite fibers or substrates

Dr. D.U. Gubser



Basic Responsibilities

The Materials Science and Technology Division conducts basic and applied research and engages in exploratory and advanced development of materials having substantive value to the Navy. R&D programs encompass the intrinsic behavior of metals, alloys, ceramics, glasses, and composites and their performance and reliability in naval structures and devices. Program objectives include achieving fundamental understanding of the mechanical, physical, electrical, magnetic, superconducting, and electrochemical properties of materials; identifying composition, processing, and microstructural parameters to produce improved materials; and developing guidelines for the selection, design, and certification of materials for life-cycle management of naval structures and systems. This diversity of programs is carried out by interdisciplinary teams of material scientists, metallurgists, ceramists, physicists, chemists, and engineers, using the most advanced testing facilities and diagnostic techniques.

Personnel

Full-time civilian: 130

Key Personnel

Name	Title	Code
Dr. D.U. Gubser	Superintendent	6300
Mr. R.W. Judy, Jr.	Associate Superintendent	6301
Mrs. A. McIntire	Administrative Officer	6302
Dr. D.U. Gubser	Program Administrator, Superconductivity Office	6302.1
Dr. R.C. Gularte	Head, Engineering Materials Group	6303
Dr. C.R. Crowe	Head, Physical Metallurgy Branch	6320
Dr. S.A. Wolf	Head, Material Physics Branch	6340
Dr. S.C. Sanday	Head, Composites and Ceramics Branch	6370
Dr. R. Badaliance	Head, Mechanics of Materials Branch	6380

Point of contact: Mrs. B. Wood, Code 6300A, 767-2926

Optical Sciences Division
Code 6500

Staff Activities

Program analysis and development
Special systems analysis
Technical study groups
Technical contract monitoring
Theoretical studies

Research Activity Areas

Optical Probes
- Laser-matter interactions
- Photophysical processes
- Nonlinear optical phenomena
- Electronic properties of materials
- Optical instrumentation
- Interferometry

Advanced Concepts
- IR low observables
- IR space surveillance systems
- EO/IR systems analysis
- Airborne IR search and track technology
- Atmospheric IR measurements
- Ship IR signatures

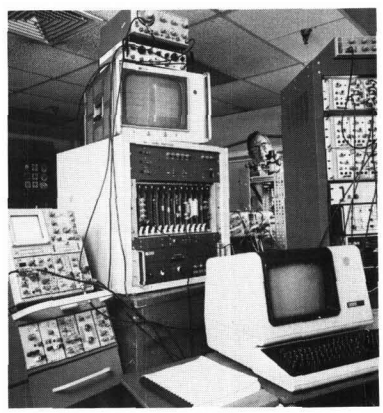
Applied Optics
- Optical image and information processing
- Optical technology
- Ultraviolet component development and UV countermeasures
- Atmospheric optics
- Propagation studies
- Laser radar

Laser Physics
- Molecular and chemical laser physics
- Interferometry
- Laser chemical kinetics
- Diode laser pumped solid state lasers
- Electrically driven lasers
- Laser-induced reactions
- Laser materials diagnostics
- Nonlinear frequency conversion
- Beam cleanup technology
- Optical phase conjugation
- Optical instrumentation and probes

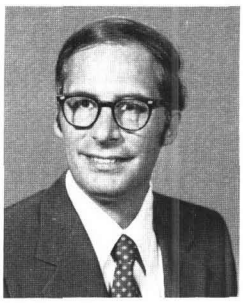
Electro-Optical Technology
- Optical and IR countermeasures
- Detection signal processing studies
- Optical seeker studies
- Solid state laser development
- Optical imager development
- Optical interactions in semiconductor superlattices
- Nonlinear optical organic solids

Optical Techniques
- Picosecond light pulses
- Diode laser applications
- Optical waveguides
- Radiation-induced defects
- Optical control of solid state electronic devices
- Fiber-optic sensors
- Integrated optics
- Fiber-optic materials and fabrication

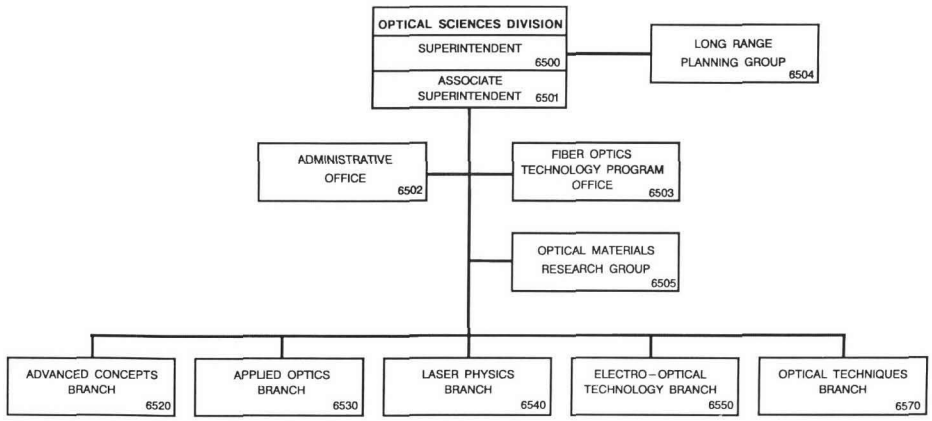
The Missile Seeker Evaluation Facility is a computerized facility that is used to evaluate optical countermeasures to infrared missile seekers and infrared imaging sensors.



The Focal Plane Array Evaluation Facility consists of the optical sources and electronics required to evaluate monolithic or hybrid infrared focal plane arrays that use charge-coupled device, charge-injection device, direct readout, or charge-imaging matrix technologies.



Dr. T.G. Giallorenzi



Basic Responsibilities

The Optical Sciences Division carries out a variety of research, development, and application-oriented activities in the generation, propagation, detection, and use of radiation in the wavelength region between near-ultraviolet and far-infrared wavelengths. The research, both theoretical and experimental, is concerned with discovering and understanding the basic physical principles and mechanisms involved in optical devices, materials, and phenomena. The development effort is aimed at extending this understanding in the direction of device engineering and advanced operational techniques. The applications activities include systems analysis, prototype system development, and exploitation of R&D results for the solution of optically related military problems. In addition to its internal program activities, the Division serves the Laboratory specifically and the Navy generally as a consulting body of experts in optical sciences. The work in the Division includes studies in quantum optics, laser physics, optical waveguide technologies, laser-matter interactions, atmospheric propagation, optical technology, holography, optical warfare, optical data processing, optical systems, optical materials, radiation damage studies, IR surveillance and missile seeker technologies, IR signature measurements, optical recording materials, and optical diagnostic techniques. A significant portion of the effort is devoted to developing, analyzing, and using special optical materials. Various field measurement programs on optical problems of specific interest are also conducted.

Personnel

Full-time civilian: 136

Key Personnel

Name	Title	Code
Dr. T.G. Giallorenzi	Superintendent	6500
Mr. J.M. McMahon*	Associate Superintendent	6501
Mrs. D.D. Nolan	Administrative Officer	6502
Mr. G. Cogdell	Head, Fiber Optics Technology Program Office	6503
Dr. J.C. Kershenstein	Long-Range Planning Group	6504
Mr. J.M. McMahon	Long-Range Planning Group	6504
Dr. R.A. Patten	Long-Range Planning Group	6504
Dr. D.L. Esterowitz	Long-Range Planning Group	6504
Dr. E.J. Friebele	Head, Optical Materials Research Group	6505
Dr. J.C. Kershenstein	Head, Advanced Concepts Branch	6520
Dr. R.A. Patten	Head, Applied Optics Branch	6530
Dr. B. Feldman	Head, Laser Physics Branch	6540
Dr. L. Esterowitz	Head, Electro-Optical Technology Branch	6550
Dr. J. Weller	Head, Optical Techniques Branch	6570

Point of contact: Mrs. D. Nolan, Code 6502, 767-2855

*Acting

Electronics Science and Technology Division

Code 6800

Research Activity Areas

Semiconductors
- Electrical, optical, and magneto-optical studies of semiconductor microstructures, surfaces, and interfaces
- Impurity and defect studies
- Structural and electronic properties of amorphous semiconductors
- Condensed matter theory
- High magnetic field phenomena

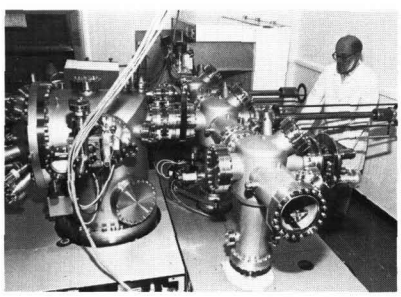
Surface Physics
- Surface and interface physics
- Vacuum surface research
- Processing research for nanometric electronics
- Growth and characterization of surfaces and interfaces
- Ion implantation technology
- Reliability and failure physics of electronic devices and circuits

Microwave Technology
- Microwave, millimeter-wave, and submillimeter-wave component and circuit research
- Microwave and millimeter-wave integrated circuits
- Surface acoustic wave devices
- High-frequency-device design, simulation, and fabrication
- High-temperature superconductors

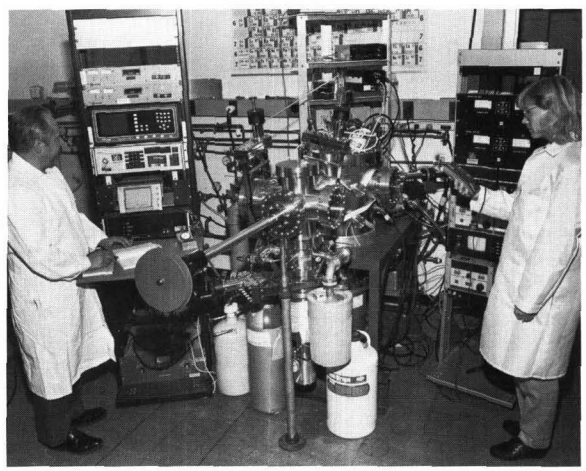
Solid State Devices
- Solid-state optical sensors
- Radiation effects/hardening of electronic devices, circuits, and optoelectronic sensors
- Microelectronics device research and fabrication
- Solid state circuits research
- Signal processing research

Electronic Materials
- Preparation and development of magnetic, dielectric, optic, and semiconductor materials
- Molecular beam epitaxy
- Metal organic chemical vapor deposition

Vacuum Electronics
- Microwave and millimeter power amplifier research and development
- Cathode research and development
- Thermionic energy conversion
- Field emission arrays
- Vacuum electronic devices
- Tube fabrication and support technology

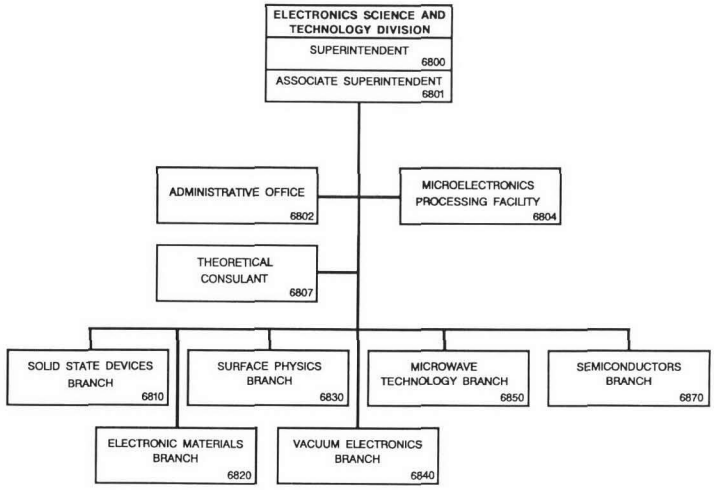


A new molecular beam epitaxy system now in operation is dedicated to the growth of thin films of new classes of narrow bandgap semiconductors. This effort joins a family of related division programs concerned with thin film semiconductor growth. These materials play pivotal roles in modern electronic device technology.



UHV sputtering system for deposition of high temperature superconducting films

Dr. G. M. Borsuk



Basic Responsibilities

The Electronics Science and Technology Division conducts programs of basic science and applied research and development in materials growth and properties, surface physics, microstructure electronics, microwave techniques, microelectronic device research and fabrication, vacuum electronics, high-power microwave generation, and cryoelectronics, including superconductors. The activities of the Division couple device research both to basic materials investigations and to systems research and development needs.

Personnel

Full-time civilian: 140

Key Personnel

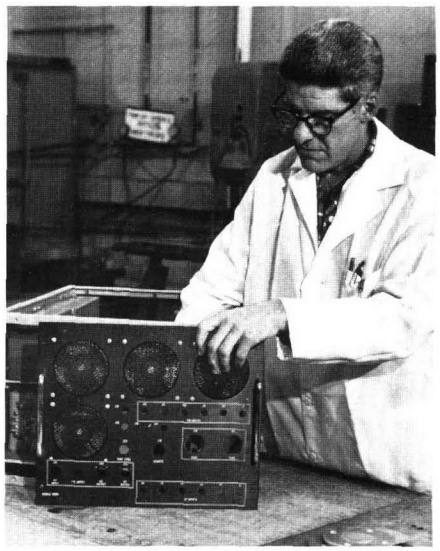
Name	Title	Code
Dr. G.M. Borsuk	Superintendent	6800
Dr. S. Teitler	Associate Superintendent	6801
Mrs. M. Bozzi	Administrative Officer	6802
Dr. M.C. Peckerar	Head, Microelectronics Processing Facility	6804
Dr. K.L. Ngai	Theoretical Consultant	6807
Dr. J.M. Killiany	Head, Solid State Devices Branch	6810
Mr. H. Lessoff	Head, Electronic Materials Technology Branch	6820
Dr. A. Christou	Head, Surface Physics Branch	6830
Dr. R.K. Parker	Head, Vacuum Electronics Branch	6840
Dr. D. Webb	Head, Microwave Technology Branch	6850
Dr. S.G. Bishop	Head, Semiconductors Branch	6870

Point of contact: Dr. Sidney Teitler, Code 6801, 767-2807

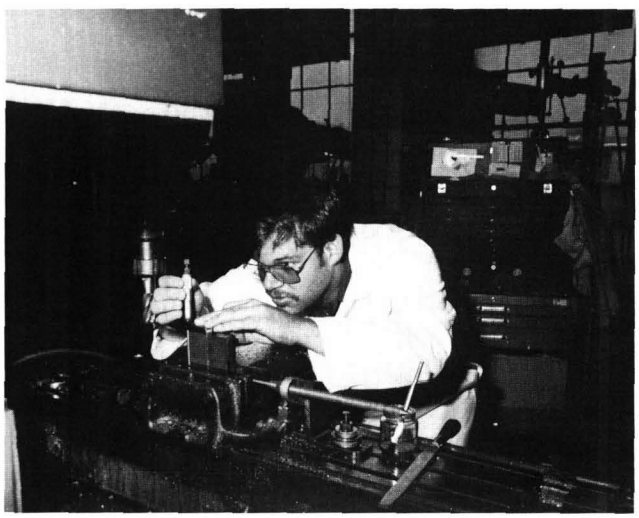
Engineering Services Division
Code 6900 (old Code 2300)

- **MECHANICAL ENGINEERING AND MANUFACTURING**
- **ELECTRONIC ENGINEERING AND FABRICATION**
- **QUALITY ASSURANCE**
- **COMPUTER-AIDED DESIGN/COMPUTER-AIDED MANUFACTURING**

Electronic engineers design and test circuits in one of ESD's laboratories by using microprocessor development systems to design and test the hardware and software. Personal computers are also used for various engineering applications such as FUTURENET, a schematic editor, and logic cell array design and simulation.

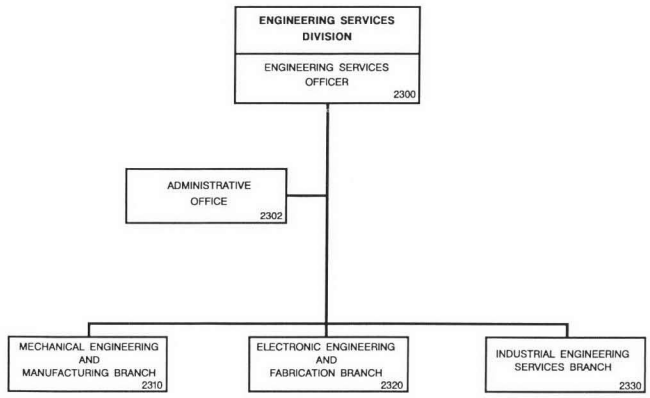


Technician from ESD's Sheet Metal Shop assembling an electronics chassis that he designed and fabricated; later he installed components provided by NRL scientists. Subsequently, the technician accompanied the scientists to the West Coast to assist in demonstrating the chassis to government and industry. The chassis is now used aboard Navy ships.



Machinist is milling a piece of copper component with a vertical milling machine for close tolerance requirements

Mr. Leo A. Sentiger, Jr.



Basic Responsibilities

The Engineering Services Division provides the engineering, design, fabrication, assembly, and test of experimental research equipment in support of the Laboratory's research efforts. Complete services covering the fields of mechanical and electronic engineering, fabrication and manufacturing, and industrial engineering services are provided. Emphasis is placed on quick reaction and flexibility to meet the needs of the Laboratory's research programs.

Mechanical support covers project engineering, computer-aided mechanical design and drafting, and thermal and structural analysis; it also includes shops for conventional machining or four-axis numerical control manufacturing, sheet metal work, welding, plating, casting, and plastic fabrication. Electronic support covers project engineering, digital and analog circuit design, microprocessor/ microcomputer-based systems design (including programming), a computer-aided printed circuit board design (REDAC and Computervision), printed circuit board fabrication, electronic assembly and testing, and cable fabrication. Industrial engineering support provides cost analyses, environmental testing, planning, and advice to management and production officials on the most effective methods and procedures to support experimental and prototype equipment requirements.

The division has the expertise to attack new problems, work with new and exotic materials on prototype developments, and provide researchers with support or consultation in these areas.

Personnel

Full-time civilian: 168

Key Personnel

Name	Title	Code
Mr. L.A. Sentiger, Jr.	Engineering Services Officer	6900
Mrs. J. Ford	Administrative Officer	6902
Mr. R.I. Perlut	Head, Mechanical Engineering and Manufacturing Branch	6910
Mr. J.A. Mills	Head, Electronic Engineering and Fabrication Branch	6920
Vacant	Head, Industrial Engineering Services Branch	6930

Point of contact: Mr. Leo Sentiger, Code 6900, 767-2300


Naval Center for
Space Technology

Naval Center for Space Technology

Code 8000

In its role to preserve and enhance a strong space technology base and provide expert assistance in the development and acquisition of space systems that support naval missions, the Naval Center for Space Technology activities extend from basic and applied research through advanced development in all areas of interest to the Navy space program. These activities include developing spacecraft, systems using these spacecraft, and ground command and control stations. Principal functions of the Center include understanding and clarifying requirements; recognizing and prosecuting promising research and development; analyzing and testing systems to quantify their capabilities; developing operational concepts that exploit new technical capabilities; system engineering to allocate design requirements to subsystems; and engineering development and initial operation to test and evaluate selected spacecraft subsystems and systems. The Center is a focal point and integrator for those divisions at NRL whose technologies are used in space systems. The Center also provides systems engineering and technical direction assistance to system acquisition managers of major space systems. In this role, technology transfer is a major goal and motivates a continuous search for new technologies and capabilities and the development of prototypes that demonstrate the integration of such technologies.

Director of Naval Center for Space Technology

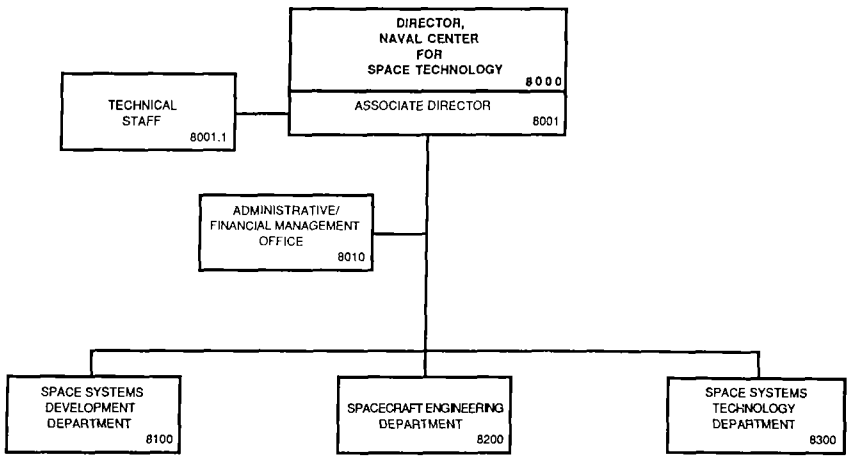
Code 8000

Mr. P.G. Wilhelm

Mr. Wilhelm [redacted] He attended Purdue University, where he received a BSEE degree in 1957. By 1961, he had completed all the course work for an MSE degree from George Washington University.

From 1957 to 1959, Mr. Wilhelm served as an electrical engineer with Stewart Warner Electronics where he was assigned to a project to redesign the UPM-70, a Navy radar test set. In March 1959, he joined the Naval Research Laboratory as an electrical scientist in the Electronics Division. In December 1959, he joined the Satellite Techniques Branch. In 1961, he became Head of the Satellite Instrument Section; in 1965, he became Head of the Satellite Techniques Branch; and in 1974, Head of the Spacecraft Technology Center. In these positions, he performed satellite system design, equipment development, environmental testing, launch operations, and orbital data handling. In 1981, he was named the Superintendent of the Space Systems and Technology Division, the Navy's principal organization, or "lead Laboratory," for space. He is credited with contributions in the design, development, and operation of 78 scientific and Fleet-support satellites. He has been awarded five patents. In October 1986, he was appointed Director of the newly established Naval Center for Space Technology. The Center's mission is to "preserve and enhance a strong space technology base and provide expert assistance in the development and acquisition of space systems which support naval missions."

Mr. Wilhelm has been recognized with numerous awards including the Navy's Meritorious Civilian Service Award, the Distinguished Civilian Service Award, the Presidential Meritorius Executive Award, NRL's Space Systems Program Achievement Award, the Institute of Electrical and Electronics Engineers Aerospace and Electronic Systems Group Man of the Year Award in 1981, the NRL E.O. Hulburt Annual Science and Engineering Award for 1982, and the Dexter Conrad Award. He also has been elected a Fellow of the Washington Academy of Sciences and an Associate Fellow of the American Institute of Aeronautics and Astronautics.



Key Personnel

Name	Title	Code
Mr. P.G. Wilhelm	Director, Naval Center for Space Technology	8000
Mr. F.V. Hellrich	Associate Director, Naval Center for Space Technology	8001
Mrs. L.T. McDonald	Head, Administrative/Financial Management Office	8010
Mr. R.E. Eisenhauer	Superintendent, Space Systems Development Department	8100
Mr. R.T. Beal	Superintendent, Spacecraft Engineering Department	8200
Mr. L.M. Hammarstrom	Superintendent, Space Systems Technology Department	8300

Point of Contact: Mr. F.V. Hellrich, Code 8001, 767-6549

Space Systems Development Department

Code 8100

Research Activity Areas

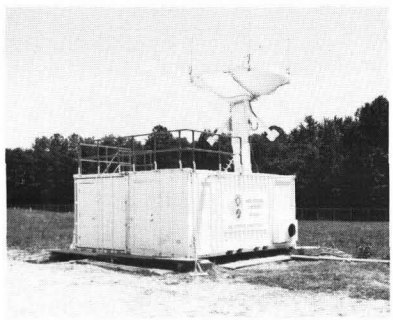
Special Projects
- Advanced and experimental communications systems for spacecraft and earth terminals
- Investigations and technology assessment of advanced satellite programs

Spacecraft Engineering
- Spacecraft power and ordnance systems
- Aerospace systems fabrication
- Quality assurance and reliability
- Spacecraft test systems designs

Advance Systems Development
- Survivability concepts
- Spaceborne signal and data processors development
- Spacecraft telemetry, command, and data management

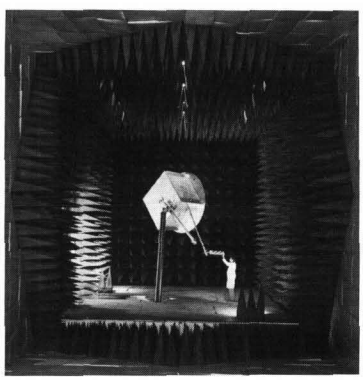
Communications Systems Technology
- Advanced space and related ground communications systems
- Radio frequency active components and antennae
- Communications systems study and analysis
- Electromagnetic spectrum utilization
- Laser-based optical communications systems

Terrestrial Systems
- Software for collection systems control
- Advanced satellite ground station design
- Fleet-deployed satellite systems



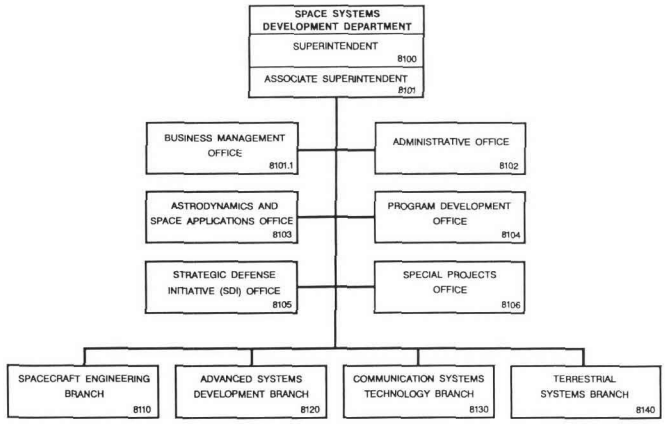
The transportable ground station for the low-power atmospheric compensation experiment (LACE) spacecraft is shown in an operationally ready configuration. Housed in strong, low cost cargo "containers," the station is easily handled for shipment by truck, rail, ship, or aircraft.

Ground station containers are swallowed by a C-141 cargo aircraft for overseas deployment.



The RF Anechoic Chamber is used to test and qualify satellites and other spacecraft components. It simulates the RF environment of free space so that accurate measurements can be made.

Mr. R.E. Eisenhauer



Basic Responsibilities

The Space Systems Development Department (SSDD) is the space systems research and development organization of the Naval Center for Space Technology. The SSDD develops space systems (both satellite and ground elements) to support Navy mission requirements and develops new technologies for use in space. Research continually strives to improve performance, capacity, reliability, efficiency, and life-cycle cost. To this end, the SSDD defines system requirements based on overall mission objectives, develops alternative system architectures, and designs and develops optimized operational space/ground systems. These development responsibilities extend across the entire space/ground spectrum of hardware, software, and systems advanced technologies including digital processing and control, analog, power, communications, command and telemetry, radio frequency, optical, and electromechanical systems. The SSDD pursues advanced concepts studies, analyses, and technical enhancements that enable advanced systems.

Personnel

Full-time civilian: 164

Key Personnel

Name	Title	Code
Mr. R.E. Eisenhauer	Superintendent	8100
Mr. F.E. Betz	Associate Superintendent	8101
Mr. J. Asher	Head, Business Management Office	8101.1
Ms. D.E. Mignogna	Administrative Officer	8102
Mr. B. Kaufman	Head, Astrodynamics & Space Applications Office	8103
Mr. J.G. Winkler	Head, Program Development Office	8104
Mr. R.E. Palma	Head, Strategic Defense Initiative Office	8105
Mr. W.R. Webster	Head, Special Projects Office	8106
Mr. G.E. Flach	Head, Spacecraft Engineering Branch	8110
Mr. A.J. Fox	Head, Advanced Systems Development Branch	8120
Mr. J.F. Mattaino	Head, Communication Systems Technology Branch	8130
Mr. T.W. Fisher	Head, Terrestrial Systems Branch	8140

Point of contact: Ms. D.E. Mignogna, Code 8102, 767-0432

Spacecraft Engineering Department

Code 8200

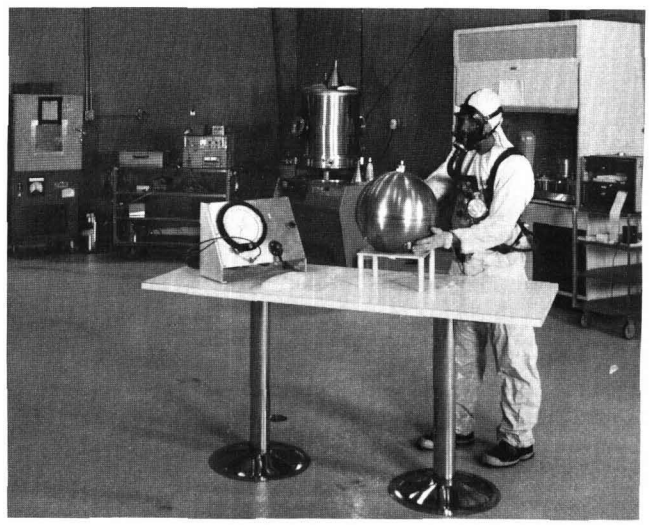
Research Activity Areas

Design, Manufacturing and Processing
- Launch vehicle integration
- Spacecraft production design, planning, manufacturing, and assembly

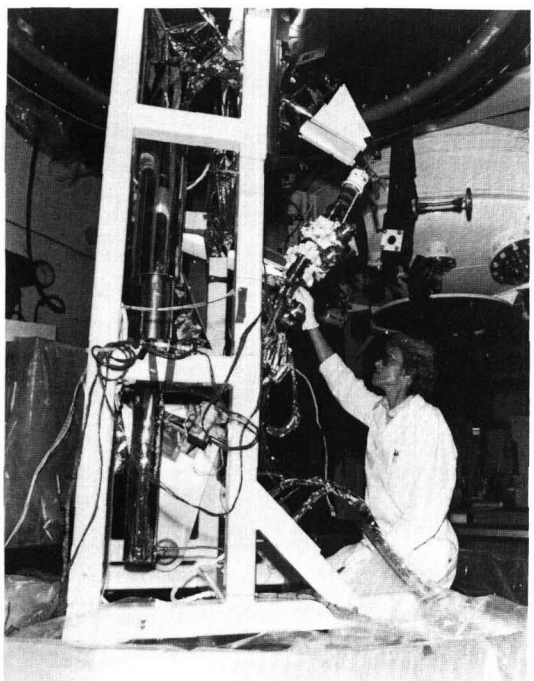
Systems Analysis and Test
- Spacecraft structural design
- Spacecraft environmental testing
- Mechanical analysis and testing

Control Systems Branch
- Attitude and thermal control system
- Reaction control systems
- Propulsion systems
- Launch operations support

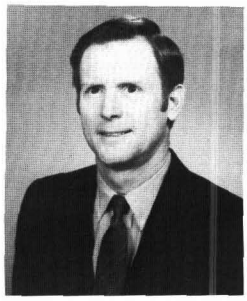
Concept Development
- Engineering analysis and conceptual design for new space systems
- Flexible space structures research
- Expert systems
- Spaceborne applications of robotics



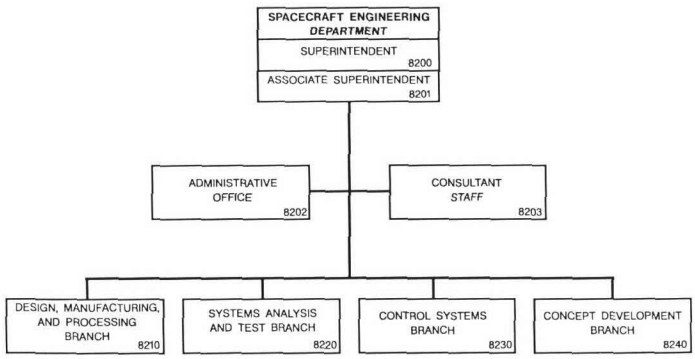
A specially designed and constructed facility for the safe handling and testing of propellants used in Naval Center for Space Technology spacecraft



Ball-screw actuator being readied for vacuum-chamber test



Mr. R.T. Beal



Basic Responsibilities

The Spacecraft Engineering Department (SED) is the focal point for the Navy's in-house spacecraft capability. The two primary functions of the SED are to design and build spacecraft platforms in support of Navy missions and to provide transfer vehicles to inject these spacecraft into their unique mission orbits. The activities of the SED range from concept and feasibility planning through the on-orbit Initial Operational Capability (IOC) for Navy space systems. The SED provides analysis, design, and hardware expertise in structures and mechanisms, attitude control systems, propulsion and reaction control systems, thermal control systems, satellite design integration, launch vehicle integration, and satellite-to-boost-stage integration.

The SED functions as a program manager for Navy programs by providing systems engineering and technical direction while maintaining an active in-house satellite development, test, and fabrication capability. In this role, the SED performs as a prototype laboratory and pursues the program to facilitate the transfer of technology to industry so that production satellites can be built in a cost-effective environment. To accomplish this, the SED supports the Navy Program Acquisition Office by providing experienced technical consultation after the prototype is built at NRL.

Personnel

Full-time civilian: 70

Key Personnel

Name	Title	Code
Mr. R.T. Beal	Superintendent	8200
Vacant	Associate Superintendent	8201
Mrs. C. Warner	Administrative Officer	8202
Mr. A.D. Watts	Consultant Staff	8203
Mr. R. Barnes	Head, Design, Manufacturing, and Processing Branch	8210
Mr. E. Senasack	Head, Systems Analysis and Test Branch	8220
Mr. S. Hollander	Head, Control Systems Branch	8230
Mr. M. Brown	Head, Concept Development Branch	8240

Point of contact: Mr. R.T. Beal, Code 8200, 767-6407

Space Systems Technology Department

Code 8300

Research Activity Areas

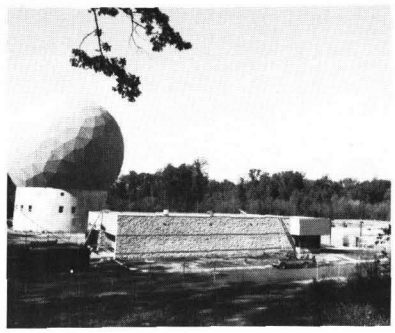
Navy Space Technology
- Technical consultant to current Navy space programs
- Navy technology planning
- Exploratory development block management

Space Sensing
- Surveillance sensor and algorithm development
- Electromagnetic and scatter research
- Surveillance system performance
- Requirements definition

Space Applications
- Navigation systems
- Time synchronization
- Hydrogen masers
- Frequency standard development

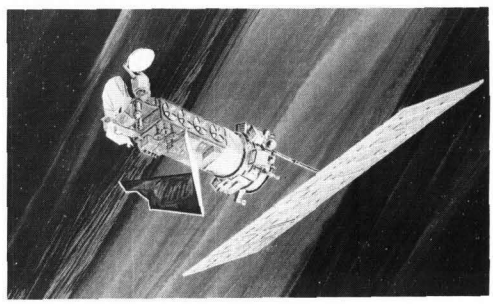
Systems Engineering and Analysis
- Space system integration and test
- Space system technical evaluation
- Space and naval warfare

Advance Concepts Processing Branch
- Coherent receiver development
- Spacecraft calibration systems
- Advance data processing development

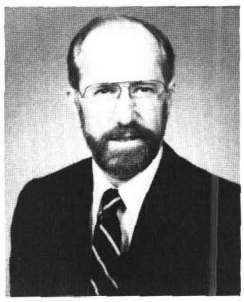


View of the Midway Research Center (MRC), space tracking facility in Stafford, VA

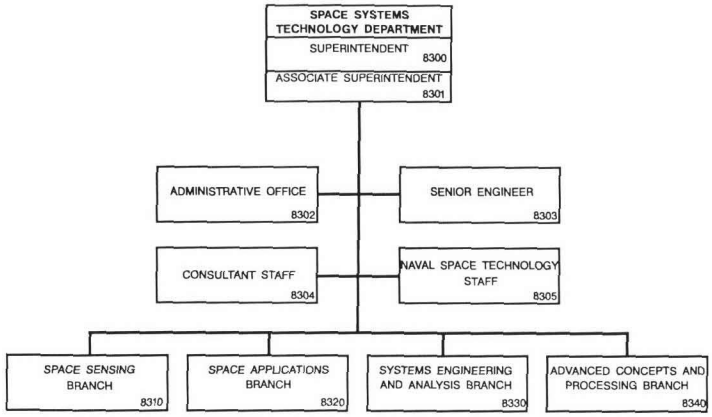
Satellite tracking and calibration facility



NRL is leading a joint Navy/Air Force program to calibrate and validate the SSM/I sensor and environmental data products. The SSM/I, built by the Hughes Aircraft Company, is an operational sensor onboard the Defense Meteorological Satellite Program (DMSP) spacecraft, and provides measurements of critical atmospheric, oceanographic, and land parameters on a global scale. These parameters include detection and measurement of rain storms, ocean surface windspeed, mapping of sea-ice concentration and ice/water boundaries, and land surface moisture and temperature.



Mr. L. Hammarstrom



Basic Responsibilities

The Space Systems Technology Department (SSTD) is involved in a wide range of activities from basic research through concepts, technology, and testing of space systems. The department has highly skilled teams doing research on remote sensing of the oceans of the world and state-of-the-art frequency standards from the Global Positioning System and the Naval Observatory. It continues to improve the Naval Space Surveillance System. The SSTD builds complex receiving and transmitting systems that exploit the latest concepts in microprocessing and device technologies. Detailed analysis, simulation, and testing are performed on space systems. Hardware, software, and computer systems for use in space systems are being developed. Two remote field sites, a large wavetank facility, and the NRL P-3 aircraft support the work. The SSTD interacts with operational forces in examining areas for future research and development.

Personnel

Full-time civilian: 112

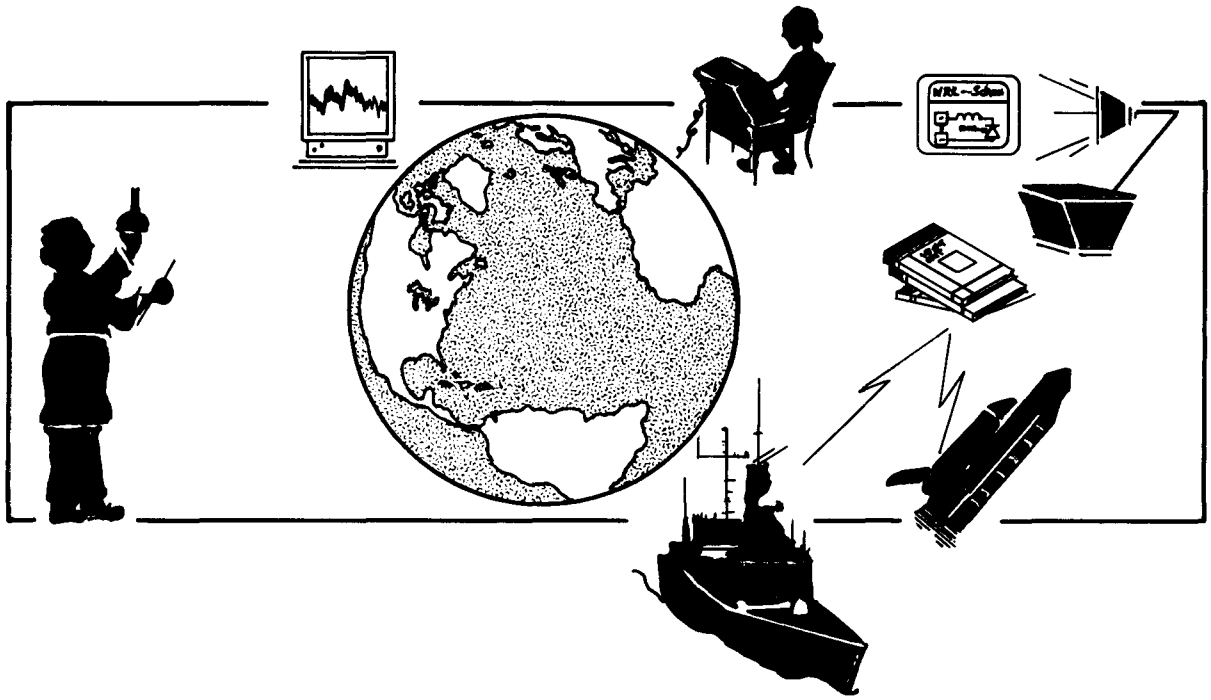
Key Personnel

Name	Title	Code
Mr. L.M. Hammarstrom	Superintendent	8300
Mr. G.W. Hoskins	Associate Superintendent	8301
Ms. E.M. Coates	Administrative Officer	8302
Mr. D.L. Pettit	Senior Engineer	8303
Mr. L.M. Hammarstrom	Head, Consultant Staff	8304
Mr. M. Lister	Consulting Expert for the Office of the Secretary of the Air Force	8304L
Mr. G.R. Price	Head, Naval Space Technology Staff	8305
Dr. V.E. Noble	Head, Space Sensing Branch	8310
Mr. R.L. Beard	Head, Space Applications Branch	8320
Mr. T.F. Lawton	Head, Systems Engineering and Analysis Branch	8330
Mr. J.N. O'Connor	Head, Advanced Concepts and Processing Branch	8340

Point of contact: Ms. E.M. Coates, Code 8302, 767-6546

Technical Output, Fiscal, and Personnel Information

Technical Output



Publications

Scientists and engineers at the Naval Research Laboratory have published more than 30,894 articles, reports, and books since the Laboratory was established in 1923. During fiscal year 1989, NRL researchers published 1 book, 512 journal articles, and 232 NRL reports. In addition, their works were described in 291 conference proceedings; 1495 presentations were made to scientific, military, and government audiences.

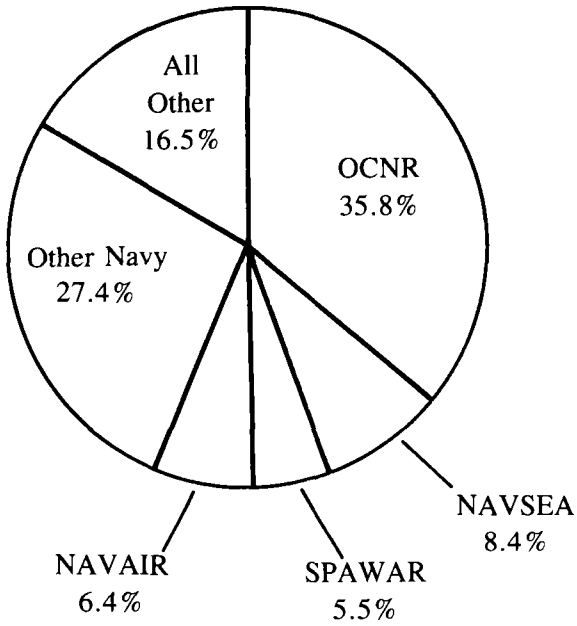
Patents

NRL scientists have made significant contributions in many areas of technology. The quality and quantity of these contributions can be measured by the number of patents received and applications filed. During fiscal year 1989, researchers were awarded 26 patents; this brings NRL's total of patents issued since 1923 to 3329. The number of patent applications filed during this period increased to 63; 2 SIRs were also filed. To date, 25 SIRs have been issued to NRL researchers.

In 1986, Congress enacted the Federal Technology Transfer Act in an effort to encourage the commercial use of technology developed in federal laboratories. The Act allows Government inventors and the laboratories where they work to share the royalties generated by commercial licensing of their inventions. Also, the Act encourages the establishment of cooperative research and development agreements between laboratories such as NRL and nonfederal entities such as state and local governments, universities, and business corporations. Such cooperative R&D agreements can include the allocation in advance of patent rights on any inventions made under the joint research effort.

The 1986 Act has given additional impetus to the Laboratory's efforts to patent important inventions arising out of its various research programs.

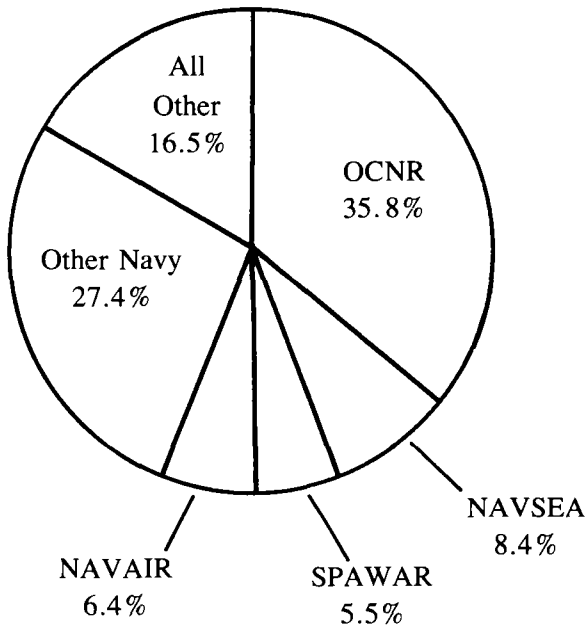
FY 1989 SOURCES OF NEW FUNDS (ACTUAL)



% Source of Funds

	$M		
	Reimbursable	Direct Cite	Total
Office of the Chief of Naval Research (OCNR)	134.7	70.0	204.7
Space and Naval Warfare Systems Command (SPAWAR)	18.7	12.9	31.6
Naval Air Systems Command (NAVAIR)	20.8	15.8	36.6
Naval Sea Systems Command (NAVSEA)	30.1	17.6	47.7
Other Navy	91.4	64.9	156.3
All Other	51.4	42.8	94.2
Total Funds	347.1	224.0	571.1

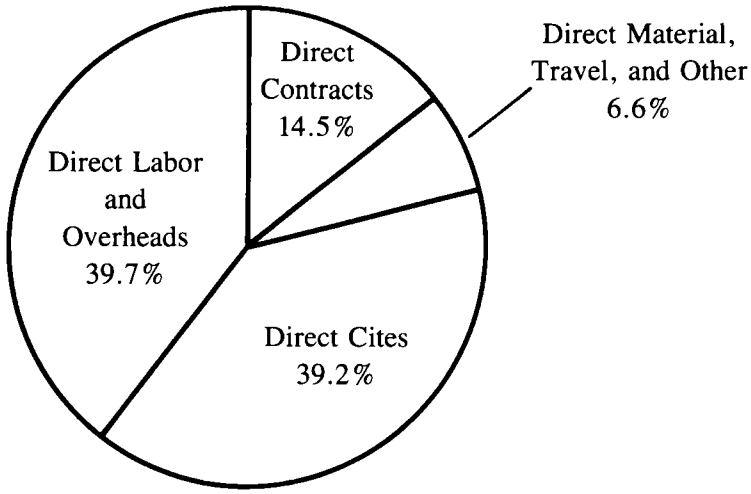
FY 1990 SOURCES OF NEW FUNDS (PLAN)



% Source of Funds

	$M		
	Reimbursable	Direct Cite	Total
Office of the Chief of Naval Research (OCNR)	140.2	84.6	224.8
Space and Naval Warfare Systems Command (SPAWAR)	19.6	15.1	34.7
Naval Air Systems Command (NAVAIR)	21.7	18.5	40.2
Naval Sea Systems Command (NAVSEA)	31.4	21.0	52.4
Other Navy	95.1	76.6	171.7
All Other	53.7	49.8	103.5
Planned Total Funds	361.7	265.6	627.3

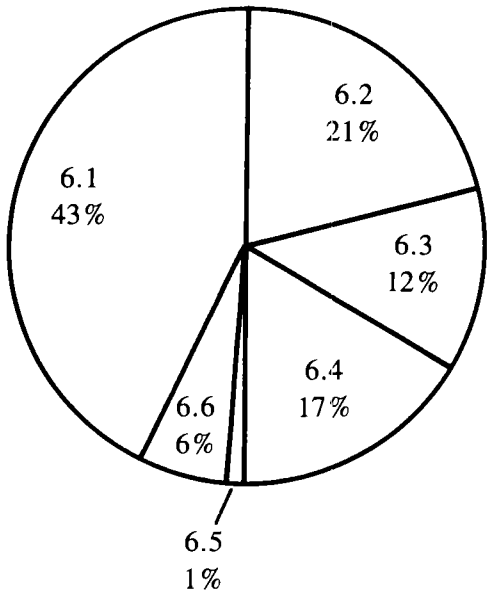
FY 1990 DISTRIBUTION OF NEW FUNDS (PLAN)



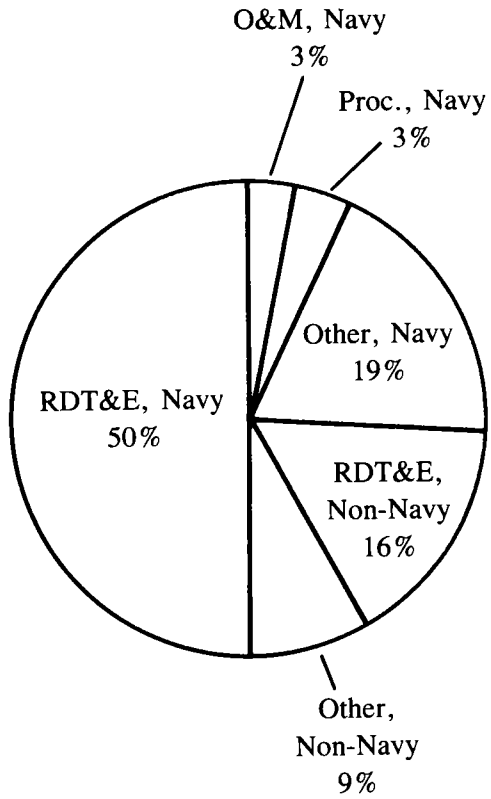
% Distribution of Funds

	$M
Direct Labor	108.4
General Overhead	78.0
Indirect Overhead	62.8
Direct Material, Travel, and Other	41.3
Direct Contracts	90.8
Direct Cites	246.0
Total	627.3

FY 1990 REIMBURSABLE NEW FUNDS BY CATEGORY (PLAN)



% Distribution of RDT&E, Navy ($179.7)



% Distribution Reimbursable ($361.8)

		$M	
Category	Navy	Non-Navy	Total
6.1 Research	76.7	1.4	78.1
6.2 Exploratory Development	38.6	9.9	48.5
6.3 Advanced Development	21.6	38.7	60.3
6.4 Engineering Development	30.6	5.3	35.9
6.5 Management & Support	2.1	0.1	2.2
6.6 Operational Systems Development	10.1	1.5	11.6
Subtotal RDT&E	179.7	56.9	236.6
Operation & Maintenance	12.2	0.7	12.9
Procurement	12.6	3.4	16.0
Other	69.3	27.0	96.3
Total Funds	273.8	88.0	361.8

Personnel*

Civilian

Full-time, Permanent (FTP)		
Graded	3042	
Ungraded	412	
Total	3454	
Temporary, Part-time, Intermittent (TPTI)		
(TPTI)	246	
Total Civilian	3700	
Graded FTP Breakdown		
Scientists, Engineers, and SES		1588
Administrative—Professional		41
Administrative—Management		413
Technicians		464
Other-Clerical		422
Other-General		114
Total		3042
Civilian Budgeted		
End-Strength	3654	

Military

Officers	52
Enlisted	108
Total Military	160
Military Allowance	165

On Board	Total Military	Total Civilian	FTP	TPTI	FTP Ungraded	FTP Graded
3860	160	3700	3454	246	412	3042

Annual Civilian Turnover Rate (percent) (permanent employees only)

	1985	1986	1987	1988	1989
Research divisions	8.43	7.10	6.68	6.73	8.2
Nonresearch areas	11.68	11.32	12.14	11.83	14.5
Entire Laboratory	9.68	8.77	8.82	8.16	10.6

Highest Academic Degrees Held by Permanent Employees

Bachelors	667
Masters	390
Doctorates	767

*As of 30 September 1989

Professional Development

PROFESSIONAL DEVELOPMENT

NRL has established many programs for the professional and personal development of its employees so they may better serve the needs of the Navy. These programs develop and retain talented people and keep them abreast of advanced technology and management skills. Graduate assistantships, fellowships, sabbatical study programs, cooperative education programs, individual college courses, and short courses for personal improvement contribute to professional development.

Programs also exist for non-NRL employees. These programs enhance research efforts by providing means for non-NRL professionals to work at the Laboratory, thereby improving the interchange of ideas, meeting critical short-term technical requirements, and providing sources for new scientists and engineers. The programs include two-year graduate fellowships, faculty and professional interchanges, undergraduate work, and introducing gifted and talented high school students to the world of technology.

Programs for NRL Employees

During 1989, NRL employees participated in approximately 4688 individual training events. Many of these were presented as either video-taped or on-site instructed courses on diverse technical subjects, management techniques, and enhancement of personal skills (efficient use of time, memory improvement, interpersonal communications, speed reading, etc.).

One common study procedure is for employees to work full time at the Laboratory and take job-related scientific courses at universities and schools in the Washington area. The training ranges from individual courses to full-time graduate- and postgraduate-level programs. Tuition for job-related training is paid by NRL. Formal programs offered by NRL include the following:

Graduate Programs

- The **Advanced Graduate Research Program** (formerly the Sabbatical Study Program) enables selected professional employees to devote full time to research or course work in their own or a related field for one academic year at an institution of their choice without the loss of regular salary, leave, or fringe benefits. NRL pays all education, travel, and moving expenses for the individual and dependents. The program is open to paraprofessional (and above) employees who have completed six years of federal service, including four years at NRL.

- The **Edison Memorial Graduate Training Program** enables employees to pursue advanced studies in their fields at local universities. Eligible employees who are selected for participation in this program normally spend 24 hours of every work week in their studies. The criteria for eligibility include a minimum of one year of service at NRL, a bachelor's or master's degree in an appropriate field, and professional standing in keeping with the candidate's opportunities and experience.

- To be eligible for the **Select Graduate Student Program**, employees must have a college degree in an appropriate field and must have maintained at least a B average in undergraduate study. Accepted students devote a full academic year to graduate study. While attending school, they receive one half of their salary, and NRL pays for tuition, books, and laboratory expenses. During the summer, they work at the Laboratory and receive normal pay and fringe benefits.

- Research conducted at NRL may be used as **thesis material for an advanced degree**.

This original research is supervised by a qualified employee of NRL who is approved by the graduate school. The candidate should have completed the required course work and should have satisfied the language, residence, and other requirements of the graduate school from which the degree is sought. NRL provides space, research facilities, and supervision but leaves decisions on academic policy to the cooperating schools.

• The **Alfred P. Sloan Fellows Program** is designed for competent young executives whose job performance indicates senior management potential. The Sloan Fellows spend one year with the Massachusetts Institute of Technology faculty and with policymakers in industry and government. They study the theory and practice of effective and responsible management in a rapidly changing society.

• The **Education for Public Management Program** serves the training needs of individuals who are at midcareer and who have the talent to assume increasing responsibilities to direct agency programs and policies.

• The **Education Program for Federal Officials** exists for a small group of Federal employees who have demonstrated high competence and unusual promise. The Woodrow Wilson School of Princeton University has developed this program to enable selected midcareer officials to enlarge their knowledge in particular disciplines, to relate their fields of specialization to the broader concerns of government, and to sharpen their capacity for objective analysis of governmental problems.

• Federal Executive fellowships are available each year for employees to study in the **Brookings Institute Advanced Study Program**. In this program, the fellow is exposed to and participates in planning, developing, and conducting educational conferences on public policy issues for leaders in public and private life.

• The **Fellowship in Congressional Operations for Executives** provides an opportunity for some of the most promising young, technically oriented Federal executives to participate in a variety of assignments designed to develop their knowledge and understanding of Congressional operations. These fellows share activities with other members of the Congressional Fellowship Program who come mainly from journalism, law, and college teaching.

• The **Maxwell Midcareer Development Program** of the Maxwell Graduate School of Citizenship and Public Affairs, Syracuse, New York, increases the managerial knowledge, ability, and skills of experienced Government officials who have been identified by their agencies as having potential for advancement to positions demanding progressively greater managerial and executive responsibilities.

• The **Practicing Engineer Advanced Study Program** of the M.I.T. Center for Advanced Engineering, Cambridge, Massachusetts, enables experienced engineers and applied scientists to work in-depth in technological areas pertinent to their professions, preparing for continued leadership in an age of unparalleled technological change.

• The **Science and Technology Fellowship Program**, a subsidiary of the Commerce Science Program, includes a variety of special events, lectures, seminars, visits, conferences, field trips, and interactions with key people from both the public and private sectors. Participants spend one week on Capitol Hill in an intensive, congressional orientation; they spend one week with the Brookings Institute, Science Policy Conference; and they take two week-long field trips for on-site inspection of scientific institutions and industrial complexes.

• The **Stanford-Sloan Program of the Graduate School of Business**, Stanford, California, gives exceptional young executives an opportunity to make an intensive study of new concepts and developments in business, to develop a top management perspective, and to broaden their intellectual horizons.

• The **Naval Postgraduate School** (NPS) in Monterey, California, provides advanced graduate study for selected Federal civilian employees who meet NPS academic requirements for the program in which they are interested, and whose employing agency is willing to act as sponsor.

Continuing Education

• Local colleges and universities offer **undergraduate courses** at NRL for employees to improve their skills and keep abreast of current developments in their fields. These courses are also available at many other DoD installations in the Washington, D.C. area.

• The Employee Development Branch at NRL offers to all employees **short courses** in certain program areas that are not available at local schools; laboratory employees may attend these courses at nongovernment facilities as well. Interagency courses in management, personnel, finance, supervisory development, clerical skills, and other areas are also available.

For further information on any of the above programs, contact the Employee Development Branch at 767-2956.

Technology Transfer

• The **Office of Research and Technology Applications Program** ensures the full use of the results of the nation's federal investment in research and development by transferring federally owned or originated technology to state and local governments and the private sector.

• The **Navy Science Assistance Program** establishes an information loop between the fleet and the R&D shore establishments to expedite technology transfer to the user. The program addresses operational problems, focuses resources to solve specific technical problems, and develops a nucleus of senior scientific personnel familiar with the impact of current research and system performance on military operations.

• The **Scientist to Sea Program** (STSP) is a COMNAVSURFLANT initiative providing increased opportunities for Navy R&D laboratory/center personnel to go to sea to gain first-hand insight into operational factors affecting system design and performance.

Inquiries concerning NRL's technology transfer programs should be made to Dr. George Abraham at (202) 767-3744.

Growth Opportunities

NRL has several programs, professional society chapters, and informal clubs that enhance the professional growth of employees. Some of these are listed below.

• The **Career Counseling Center** helps employees to define short- and long-range career goals, to improve their job-seeking skills, and to deal with issues affecting job productivity.

• A chartered chapter of **Women in Science and Engineering** (WISE) has been established at NRL. Informal monthly luncheons and seminars are held to inform scientists and engineers of women's research at NRL and to provide an informal environment for practicing their presentations.

• **Sigma Xi**, the Scientific Research Society, encourages original investigation in pure and applied science. The NRL chapter of approximately 450 active members meets nine times each year (from October to June) and sponsors a series of lectures on a wide range of pure and applied scientific topics of interest to both scientific and government communities. Each spring it sponsors an Edison Memorial Lecture at which a distinguished scientist, usually a Nobel Laureate, speaks on his or her research. The chapter also presents annual awards in pure and applied science.

• Any employee who is interested in developing effective self expression, listening, thinking, and leadership potential can join either of the two NRL chapters of **Toastmasters International**. Members of these clubs, who possess diverse career backgrounds and talents, meet three times a month to learn to communicate not by rules but by doing in an atmosphere of understanding and helpful fellowship.

Other programs that enhance the development of NRL employees include computer clubs (Edison Atari, Edison Commodore, and the NRL-IBM PC) and the Amateur Radio Club. The Recreation Club offers many facilities to promote physical fitness. The Showboaters, a nonprofit drama group, presents live theater for the enjoyment of NRL and the community and produces two major productions each year, in addition to occasional performances at Laboratory functions and benefits for local charities.

Programs for Non-NRL Employees

Programs also exist for non-NRL employees. These programs encourage and support the participation of visiting scientists and engineers in research of interest to the Laboratory. Some of the programs may serve as stepping stones to federal careers in science and technology. Their objective is to enhance the quality of Laboratory research activities through working associations and interchanges with highly capable scientists and engineers and to provide opportunities for outside scientists and engineers to work in the Navy laboratory environment. Along with enhancing NRL research, these programs acquaint participants with Navy capabilities and concerns.

Recent Ph.D., Faculty Member, and College Graduate Programs

• The **National Research Council (NRC)/NRL Cooperative Research Associateship Program** selects associates who conduct research at NRL in their chosen fields in collaboration with NRL scientists and engineers. The tenure period is two years, and following their tenure, the Office of Naval Research offers the associate posttenure research grants tenable at an academic institution.

• The American Society for Engineering Education (ASEE) administers the **Office of Naval Technology (ONT) Postdoctoral Fellowship Program** to increase the involvement of highly trained scientists and engineers in disciplines to meet the evolving needs of naval technology. Appointments are for one year (renewable for a second and sometimes a third year). The appointments are competitive and are made jointly by ONT and ASEE.

• The American Society for Engineering Education also administers the Navy/ASEE **Summer Faculty Research Program** for university faculty members to work for 10 weeks with professional peers in participating Navy laboratories on research of mutual interest.

• The **NRL/United States Naval Academy (USNA) Cooperative Program for Scientific Interchange** allows faculty members of the U.S. Naval Academy to participate in NRL research. This collaboration benefits the Academy by providing the opportunity for USNA faculty members to work on research of a more practical or applied nature. In turn, NRL's research program is strengthened by the available scientific and engineering expertise of the USNA faculty.

• The **Office of Naval Research Graduate Fellowship Program** helps U.S. citizens obtain advanced training in disciplines of science and engineering critical to the U.S. Navy. The three-year program awards fellowships to recent outstanding graduates to support their study and research. This research must lead to doctoral degrees in specified disciplines such as electrical engineering, computer sciences, material sciences, applied physics, and ocean engineering. Award recipients are encouraged to continue their study and research in a Navy laboratory during the summer.

Contact: Mrs. Jessica Hileman, 767-3865

• The **United States Naval Academy Ensign Program** assigns Naval Academy graduates to NRL to work in areas of their own choosing and commensurate with their academic qualifications. These graduates provide invaluable summer research assistance while gaining experience in Navy R&D programs.

Contact: Military Administrative and Personnel Branch, 767-2103

Professional Appointments

• **Faculty Member Appointments** use the special skills and abilities of university faculty

members for short periods to fill scientific, engineering, professional, or analytical positions.

• **Consultants and experts** are employed because they are outstanding in their specialized fields or because they possess rare abilities but cannot normally be employed as regular full-time civil servants.

• **Intergovernmental Personnel Act Appointments** temporarily assign personnel from state or local governments or educational institutions to the Federal Government (or vice versa) to improve public services rendered by all levels of government.

Contact: Special Recruitment Programs Branch, 767-3030

Undergraduate College Student Programs

Several programs are tailored to the undergraduate that provide employment and work experience in naval research. These are designed to attract applicants for professional employment in the Laboratory's shortage category positions such as engineers, physicists, mathematicians, and computer scientists. The student employment programs foster an understanding of NRL job opportunities among students and educational personnel so that educators can provide students who will meet NRL's occupational needs. The employment programs for college students include:

• The **Cooperative Education Program** alternates periods of work and study for students pursuing bachelor degrees in engineering, computer science, or the physical sciences. Several universities participate in this program.

• The **Federal Junior Fellowship Program** hires students entering college to be assistants to scientific, professional, or technical employees.

• The **Summer Employment Program** employs students for the summer in paraprofessional and technician positions in engineering, physical sciences, and computer sciences. A limited number of positions are also filled in administrative occupations.

• The **Student Volunteer Program** helps students gain valuable experience by allowing them to voluntarily perform educationally related work at NRL.

• The **1040-Hour Appointment** employs students on a halftime basis to assist in scientific work that is related to their academic program. A limited number of positions are also filled in administrative occupations.

Contact: Special Recruitment Programs Branch, 767-3030

High School Programs

• The **Gifted and Talented Internship Program** provides a meaningful, part-time employment experience for high school graduates who plan to pursue a bachelor's degree in engineering, computer science, or the physical sciences.

Contact: Special Recruitment Programs Branch, 767-3030

• The **DOD Summer Science and Engineering Apprentice Program** employs high school juniors and seniors to serve for eight weeks as junior research associates as part of a university grant program. Under the direction of a mentor, students gain a better understanding of research, its opportunities, and challenges through participation in scientific programs. Criteria for eligibility are based on science and mathematics courses completed and grades achieved; scientific motivation, curiosity, and capacity for sustained hard work; a desire for a technical career; teacher recommendations; and ability and achievement test scores.

• The **Clerical Cooperative Education Program** allows students to work part time while attending high school. Several high schools participate in this program.

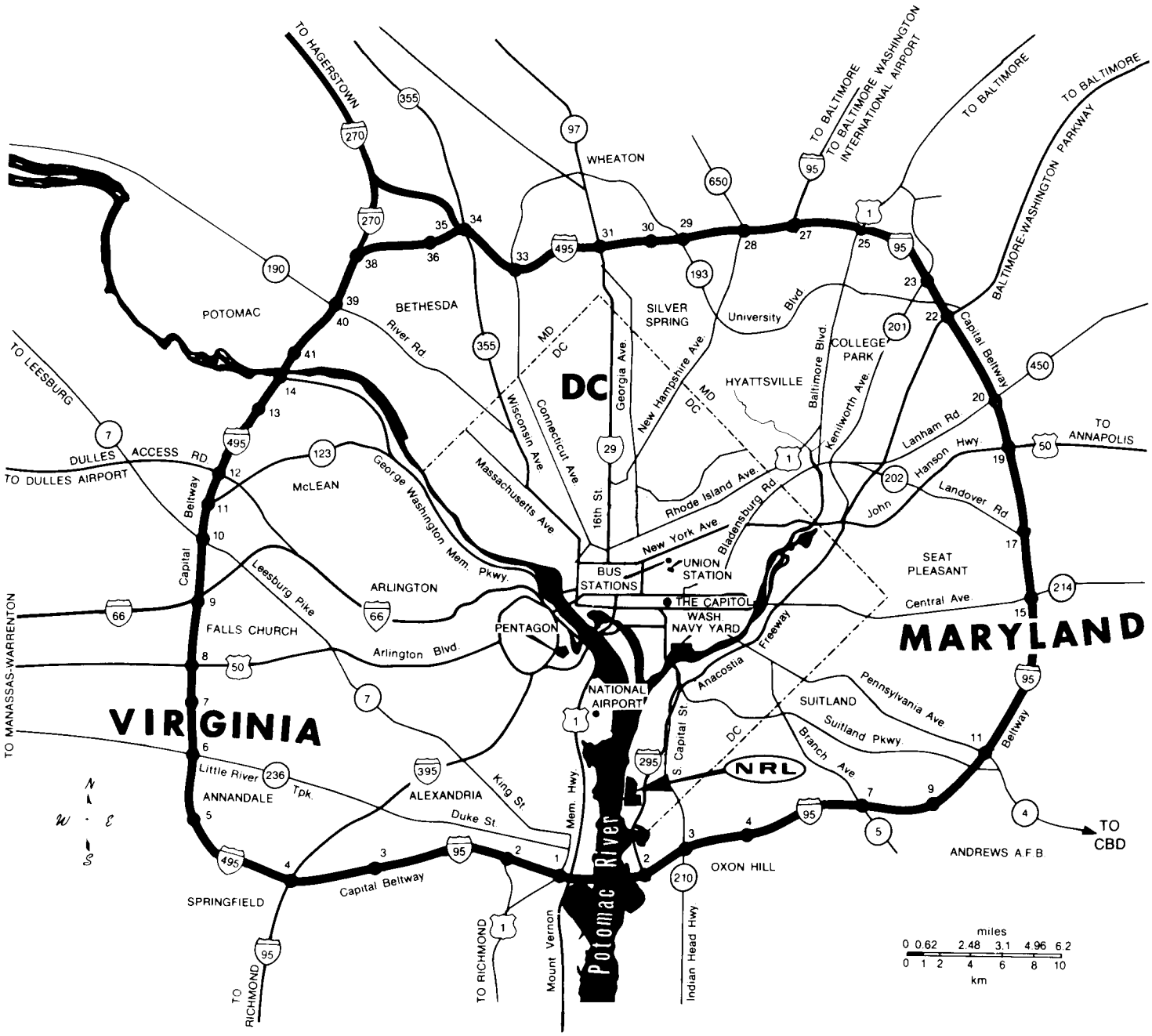
Contact: Special Recruitment Programs Branch, 767-3030

1989 Government Awards to Civilian Employees

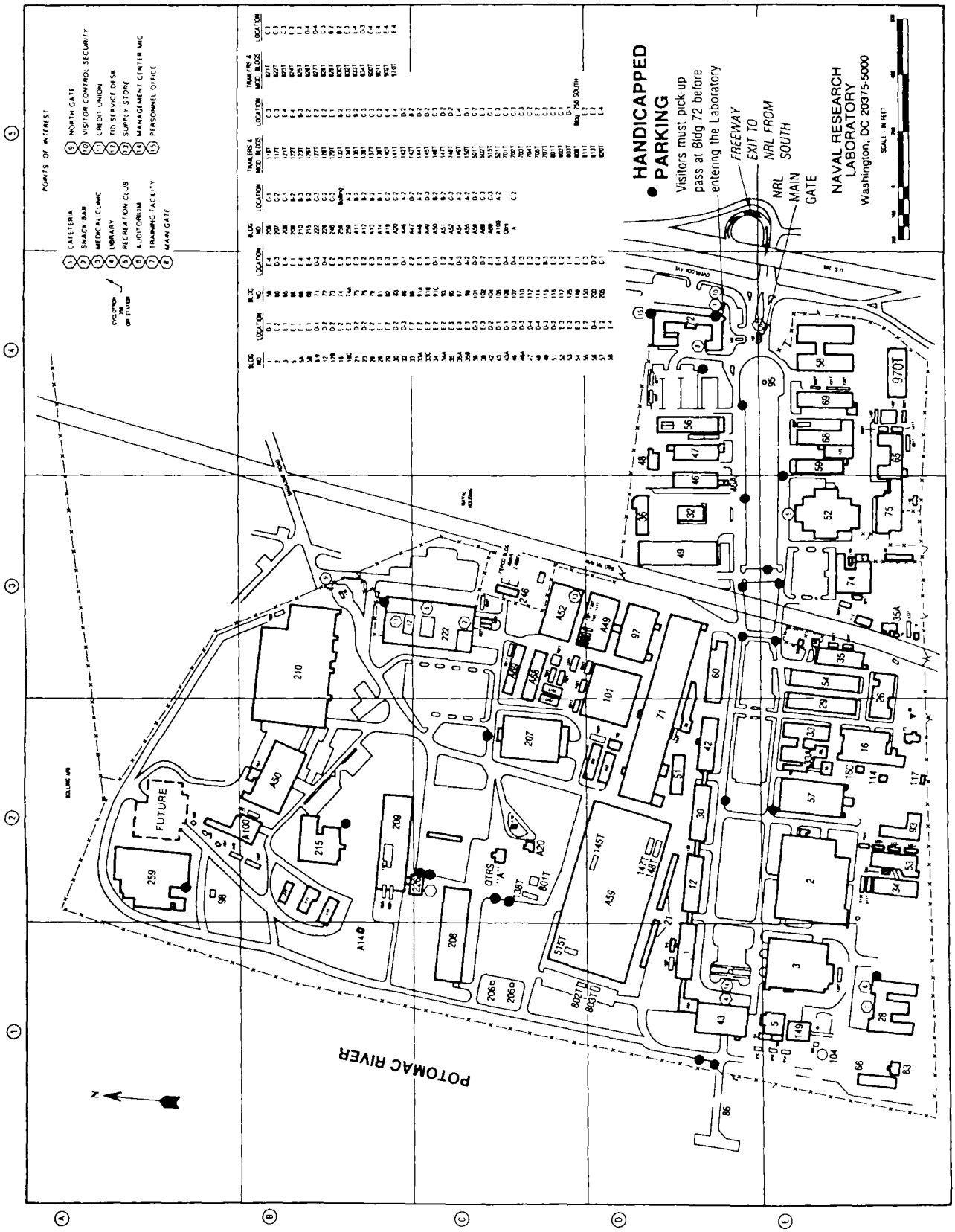
	Number
Meritorious Executive Award, Senior Executive Service	2
Senior Executive Service Bonus Award	11
Navy Meritorious Civilian Service Award	4
Navy Superior Civilian Service Award	1
E.O. Hulburt Award for Science and Engineering	1
NRL Award for Achievement in the Field of Equal Opportunity	2
Navy Award of Merit for Group Achievement	2

General Information

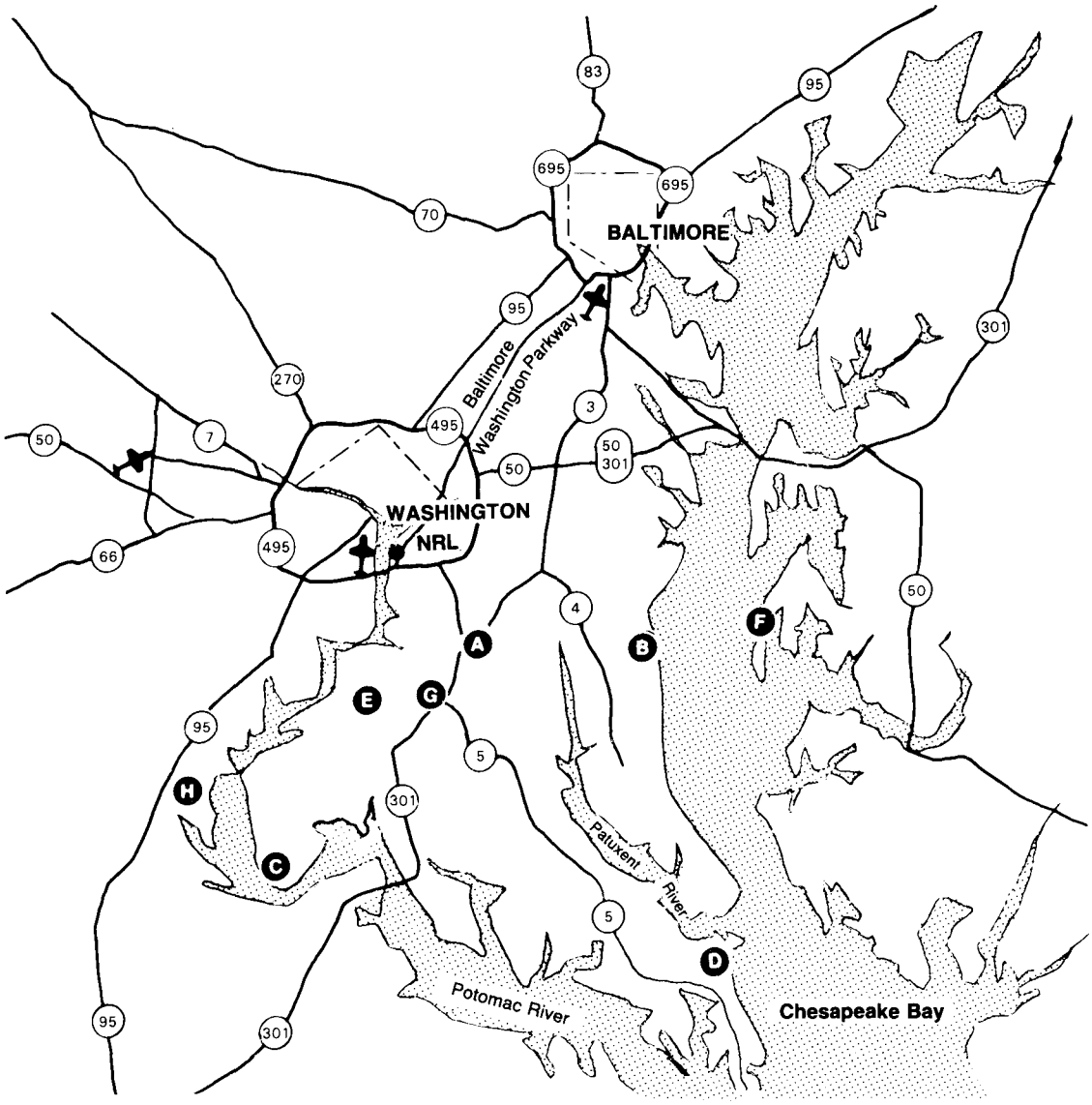
Location of NRL in the Capital Area



Location of Buildings at Main Site



Location of Principal Field Stations



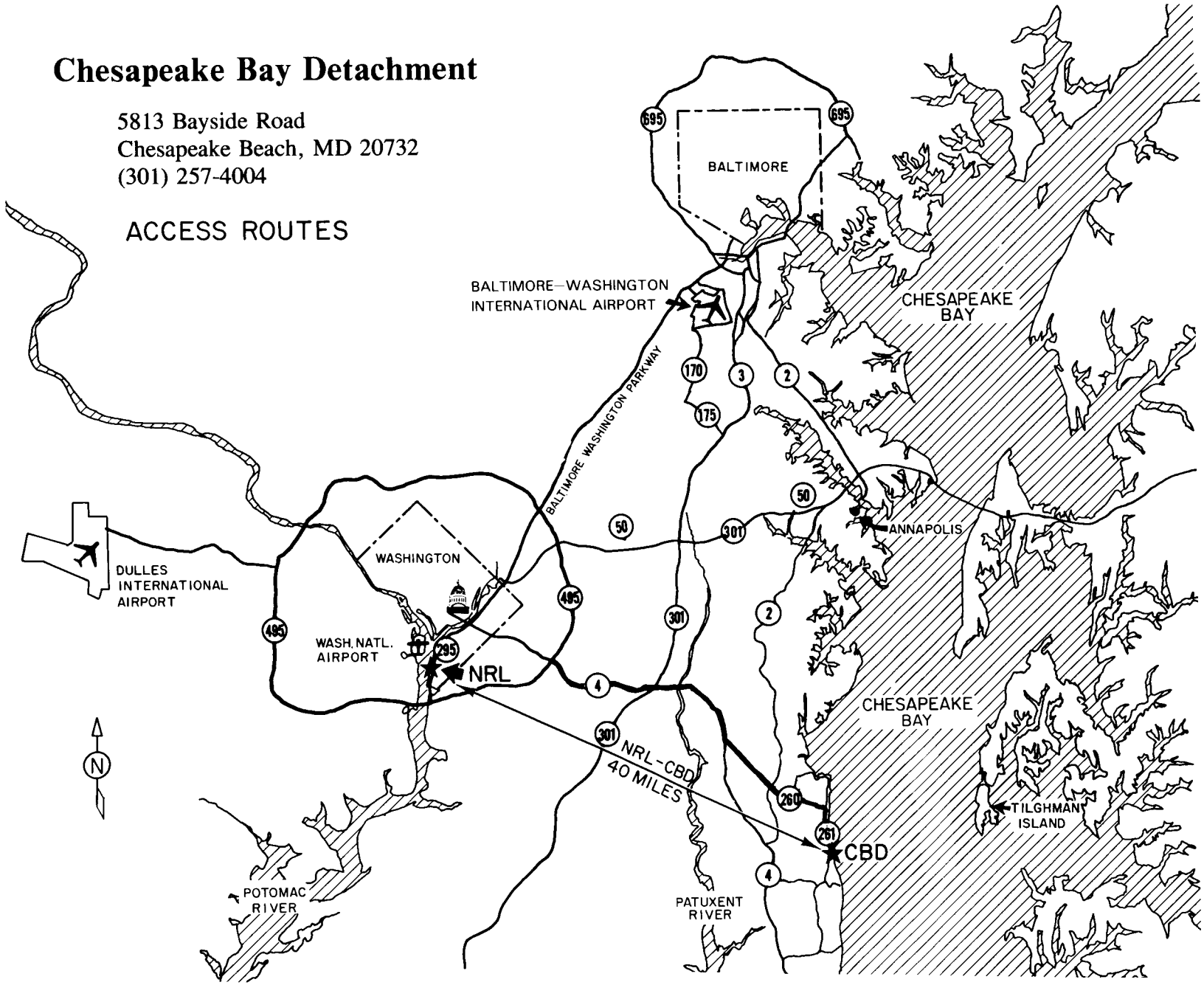
Approximate distance from NRL

Location	Miles	Cognizant Code
A — Brandywine, MD	28	5500
B — Chesapeake Bay Detachment (CBD), Chesapeake Beach, MD	40	2700
C — Maryland Point (MD) Observatory	45	4130
D — Patuxent River (MD) Naval Air Station	64	1280
E — Pomonkey, MD	20	8325
F — Tilghman Island, MD	110	2700
G — Waldorf Radio Site, MD	24	5500
H — Midway Research Center, Quantico, VA	38	8341

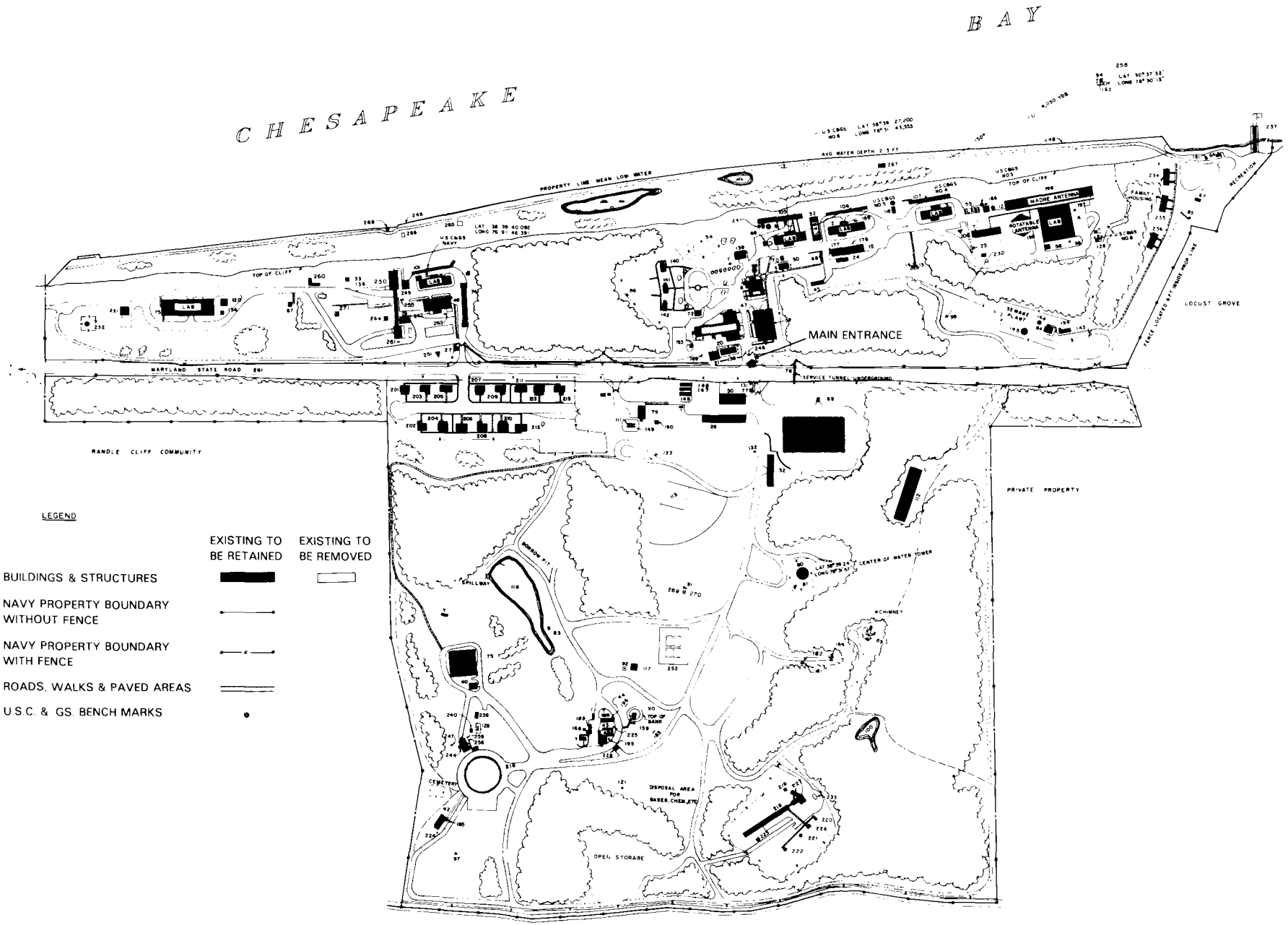
The Underwater Sound Reference Detachment (Code 5900) is located at Orlando, FL

Chesapeake Bay Detachment

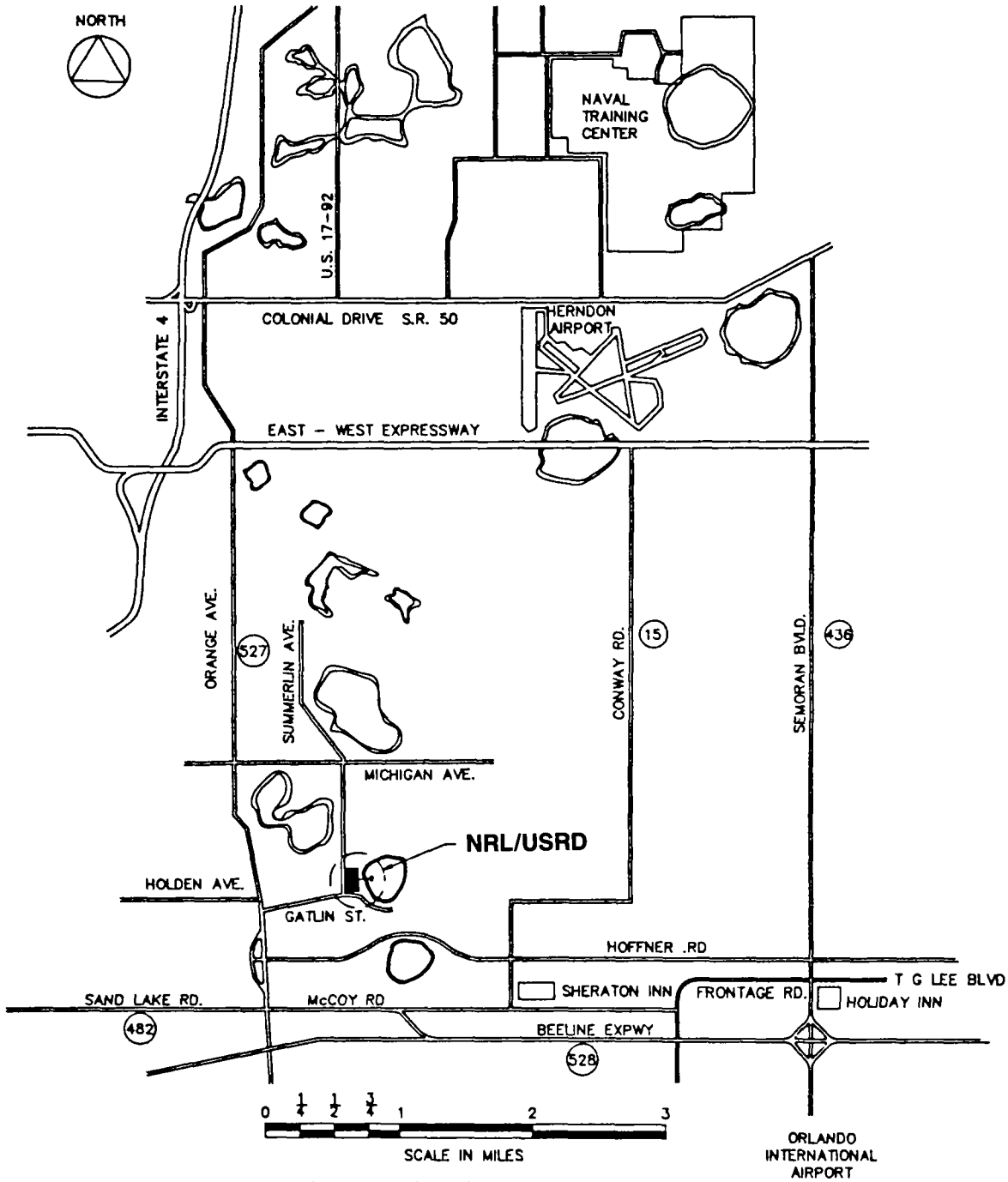
5813 Bayside Road
Chesapeake Beach, MD 20732
(301) 257-4004



Location of Buildings at Chesapeake Bay Detachment



Underwater Sound Reference Detachment (Orlando, Florida)



Naval Research Laboratory
Underwater Sound Reference Detachment
P.O. Box 8337
Orlando, FL 32856-8337
(407) 857-5230

KEY PERSONNEL

Code			Ext. (202) 76— Autovon 29—
	EXECUTIVE DIRECTORATE		
1000	Commanding Officer	CAPT J.J. Donegan, Jr., USN	73403
1001	Director of Research	Dr. T. Coffey	73301
1002	Chief Staff Officer/Inspector General	CAPT R.W. Michaux, USN	73621
1003	Associate Director of Research for Strategic Planning	Dr. W.M. Tolles	73584
1004	Scientific Consultant to the Director of Research	Dr. P. Mange	73724
1005	Head, Office of Management and Administration	Mrs. M. Oliver	73086
1006	Exploratory Development Manager	Dr. S. Sacks	73666
1010	Associate Director of Research at Large	Mr. J.D. Brown	72879
1200	Head, Command Support Division	CAPT R.W. Michaux, USN	73621
1220	Head, Security Branch	Mr. M.B. Ferguson	73048/72240
1240	Head, Safety Branch	Mr. J.N. Stone	72232
1270	O in C Chesapeake Bay Detachment	CDR S.I. Kummer, USN	(301) 257-4002
1280	O in C Flight Support Detachment (PAX River NAS)	LCDR G.R. Viggiano, USN	(autovon) 8-356-3751
1500	Head, Program Coordination Office	Dr. R.T. Swim	73314
3008	Legal Counsel	Mr. R.H. Swennes II	72244
3803	Deputy Equal Employment Officer	Mr. W. Williams	72486
4810	Public Affairs Officer	Mr. J.W. Gately, Jr.	72541
	BUSINESS OPERATIONS DIRECTORATE		
3000	Assoc. Dir. Res. for Business Operations	Mr. R.E. Doak	72371
3008	Legal Counsel	Mr. R.H. Swennes II	72244
3030	Head, Management Information Systems Staff	Mr. R.L. Guest	72030
3200	Head, Contracting Division	Mr. J.H. Ablard	75227
3300	Comptroller	Mr. D.T. Green	73405
3400	Supply Officer	CDR W.E. Ralls, Jr., USN	73446
3500	Public Works Officer	CDR C.R. Allshouse, USN	73371
3800	Head, Civilian Personnel Division	Mrs. B.A. Duffield	73421
3803	Deputy Equal Employment Officer	Mr. W. Williams	72486
	GENERAL SCIENCE AND TECHNOLOGY DIRECTORATE		
4000	Assoc. Dir. Res. for General Science & Technology	Dr. W.R. Ellis	73324
4004	Consultant for Reactive Flow Physics	Dr. E.S. Oran	72960
4030	Director, Center for Advanced Space Sensing	Dr. K. Johnston	72351
4100	Supt., Space Science Division	Dr. H. Gursky	76343
4400	Chief Scientist & Director, Laboratory for Computational Physics and Fluid Dynamics	Dr. Jay P. Boris	73055
4600	Supt., Condensed Matter & Radiation Sciences Division	Dr. D.J. Nagel	72931
4700	Supt., Plasma Physics Division	Dr. S. Ossakow	72723
4800	Head, Technical Information Division	Mr. P. Imhof	72187/73388
4810	Head, Information Services Branch	Mr. J.W. Gately, Jr.	72541/72542
	WARFARE SYSTEMS AND SENSORS RESEARCH DIRECTORATE		
5000	Assoc. Dir. Res. for Warfare Systems and Sensors Research	Mr. R.R. Rojas	73294
5100	Supt., Acoustics Division	Dr. D.L. Bradley	73482
5300	Supt., Radar Division	Dr. M.I. Skolnik	72936
5500	Supt., Information Technology Division	Dr. R.P. Shumaker	72903
5700	Supt., Tactical Electronic Warfare Division	Dr. J.A. Montgomery	76278/73622
5800	Head, Research Computation Division	Mr. R.F. Saenger	72751
5900	Supt., Underwater Sound Reference Detachment	Dr. J.E. Blue	(407) 857-5230
	MATERIALS SCIENCE AND COMPONENT TECHNOLOGY DIRECTORATE		
6000	Assoc. Dir. Res. for Materials Science & Component Tech.	Dr. B.B. Rath	73566
6030	Chief Scientist, Laboratory for Structure of Matter	Dr. J. Karle	72665
6090	Head, Center for Bio/Molecular Science and Engineering	Dr. J. Schnur	73344
6100	Supt., Chemistry Division	Dr. J.S. Murday	73026
6300	Supt., Materials Science & Technology Division	Dr. D.U. Gubser	72926
6500	Supt., Optical Sciences Division	Dr. T.G. Giallorenzi	73171
6800	Supt., Electronics Science and Technology Division	Dr. G.M. Borsuk	73525
6900	Engineering Services Officer	Mr. L.A. Sentiger, Jr.	72300
	NAVAL CENTER FOR SPACE TECHNOLOGY		
8000	Director Naval Center for Space Technology	Mr. P.G. Wilhelm	76547
8001	Assoc. Director Naval Center for Space Technology	Mr. F.V. Hellrich	76549
8100	Supt., Space Systems Development Department	Mr. R.E. Eisenhauer	70410
8200	Supt., Spacecraft Engineering Department	Mr. R.T. Beal	76407
8300	Supt., Space Systems Technology Department	Mr. L.H. Hammarstrom	73920

MISCELLANEOUS

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Medical Clinic	7-3592

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